Against the odds - Academically resilient students with a migration background and how they succeed

Technical report

European Commission

Education and Training

Against the Odds – Academically resilient students with a migration background and how they succeed

Technical Report

Authors

Ecorys:

Matthew Cutmore

Shona MacLeod

Vicki Donlevy

Caitlin Spence

The University of New South Wales:

Andrew Martin

Rebecca Collie

Table of Contents

Introduction

This technical report is intended to be supplementary to the studies main report "Against the Odds – Academically resilient students with a migrant background and how they succeed: Final report". Here we provide technical detail of the various statistic techniques undertaken.

The technical report is structured as follows:

1. **Preparation of the dataset**: The primary dataset used for this study was PISA 2015. In this section, we provide detail about the dataset and the preparation undertaken prior to our analyses. This includes information on the specific variables used in our study and the approach to country groupings that was employed.
2. **Implementation and analysis of the classic approaches**: in this section, we provide detailed analysis of students with a migrant background identified as resilient using the resilient and highly-resilient definitions – our primary approaches to identify academically resilient students. Analysis includes the shares of resilient students by Member State; logistic regression outputs identifying factors associated with students' resilient status; multilevel models exploring resilient schools; linear regression outputs highlighting the factors associated with the achievement of students identified as resilient and; latent profile analysis to identify subgroups of different forms of resilient students.
3. **Implementation and analysis of the cluster approach**: focusing on an approach developed specifically for this study, we provide detailed analysis of students with a migrant background identified as resilient using the cluster approach. Analysis includes detailed explanation of the data reduction technique (cluster analysis) used to identify resilient students; the shares of cluster resilient students by Member State and; via logistic regression, the factors associated with resilient status, as defined by the cluster approach.
4. **Implementation and analysis of the deviation approach**: adopting an additional approach developed specifically for this study, we provide detailed analysis of students with a migrant background identified as resilient using the deviation approach. Analysis includes the linear regression models employed to predict students PISA assessment score (i.e. achievement); identification of resilient students defined as those students whose actual assessment score surpassed, by a statistically meaningful amount, their predicted scores; the shares of students by Member State and, via logistic regression, the factors associated with resilient status, as defined by the deviation approach.
5. **Consideration for minority language students:** Analysis of the shares of minority language students and factors associated with their resilience status using the classic resilient and highly-resilient approaches.

This technical report focuses solely on the analysis undertaken. For interpretation of the results, as well as policy and Member State context, please consult the main study report.

1. Preparation of the Dataset

This section explains the approach taken to preparing the dataset used in this study. It begins by describing the dataset drawn upon for this study and goes on to outline how the dataset has been used. This is followed by a summary of the steps taken to prepare the dataset and the sample sizes of student groups. Finally, we provide detail on the approach used to group Member States.

1.1 Programme for International Student Assessment (PISA)

PISA is a study carried out by the OECD in member and non-member nations. It is conducted among school pupils aged between 15 years and 3 months and 16 years and 2 months at the beginning of the assessment period. It assesses their scholastic performance in mathematics, science, and reading. The present study focuses on mathematics. Mathematics has been selected due to the relative reliability and consistency with which this subject is taught across countries compared to other subjects within the PISA dataset. In addition, PISA does not combine mathematics, science and reading domain scores into an overall score.

Since 2000 PISA has been repeated every three years. This study is based on PISA data collected in 2015 (PISA 2015). The aim of PISA is to provide countries with comparable data aimed at improving their education policies and outcomes. Only students being educated at school are tested. Each country is required to draw a sample of at least 5,000 students. In smaller countries, an entire age cohort may be tested. Each student sits a two-hour test, part of which is multiple-choice and part of which requires fuller answers. There are in fact many hours of assessment material available, but any given student is not tested on all items. The items comprise cognitive testing and questions on students' background, such as their learning habits, motivation, and home/family characteristics. Nominated school administrators complete a survey assessing school demographics, funding, structure, management, etc. Because students work on different test materials, raw scores are scaled to enable meaningful comparisons. Scores are scaled to an OECD average of 500 (SD=100) in each subject domain (mathematics in the case of this project); though later test cycles are linked to previous cycles through item response theory (IRT) methods. Proficiency estimates are developed for mathematics using a latent regression extension of the Rasch model under IRT. These provide "plausible values" which enable unbiased estimates of between-group differences.

1.2 Using PISA in the context of this study

In order to identify academically resilient and highly-resilient students, the classic approaches relied on defined "cut-offs", in the PISA dataset. Quartiles were computed for the student level variables of the index of economic, social and cultural status (ESCS) and 1st plausible value for mathematics achievement. Resilient/highly-resilient students were identified within each country. In the case of the resilient, this meant that, for each country, students were identified in the lowest quartile of ESCS and upper two quartiles of mathematics achievement for that country. Using this relative measure ensured that countries with varying levels of deprivation (measured with ESCS) and achievement are represented. Using this approach across countries rather than for each country would have resulted in a bias towards countries with, relative to OECD average levels, low ESCS.

The clustering and deviation approaches used to identify resilient students are discussed in detail in sections 3 and 4, respectively.

1.3 Data preparation

Prior to analyses, the following steps were taken:

- Student and school level data was downloaded from the OECD and merged to create a master dataset.
- Data for Cyprus was downloaded separately from the Cypriot Government website and merged with the master dataset.
- The master dataset was restricted to EU-28.
- New variables with student academic resilience status were computed using the approaches detailed sections 2, 3 and 4 of this annex.
- Sample sizes (detailed below) were assessed.
- Factors (variables) of interest were tested for missing data and collinearity.

1.4 Sample sizes for student groups

Table A.1.1 details the unweighted frequencies of academically resilient students using the classic resilient, highly-resilient, cluster and deviation approaches by migrant background, identified in the PISA 2015 dataset.

The following countries comprised of none or just one academically resilient and/or highly-resilient second-generation student and/or first-generation migrant student.

- Bulgaria
- Czech Republic
- Estonia
- Hungary
- Latvia
- Malta
- Poland
- Portugal
- Romania
- Slovakia

As academically resilient and highly-resilient students are the focus of the study, it was necessary – in order to ensure reliable estimates could be made - to create a restricted dataset that excluded the above countries for the advanced statistical analysis element of the research. The restricted dataset consisted 152,576 students[1] (74% of the 206,767 students that completed PISA in all 28 EU member states).

---

1 Those with missing migrant status and ESCS were removed from the dataset.

Table A.1.1: Unweighted frequencies of academically resilient, highly-resilient, cluster and deviation students by migrant background

	(classic) Resilient		Highly-resilient		Cluster approach		Deviation approach	
	Second-generation	First-generation	Second-generation	First-generation	Second-generation	First-generation	Second-generation	First-generation
AT	82	18	20	3	47	13	226	114
BE	67	39	24	12	61	43	214	176
CY	17	55	2	17	17	46	39	153
DE	88	14	27	4	76	9	188	40
DK	142	36	46	11	91	18	299	86
EL	52	27	18	11	39	14	95	41
ES	66	261	22	83	60	259	198	868
FI	9	5	4	3	7	8	29	36
FR	77	17	25	4	53	14	137	65
HR	50	9	21	4	69	9	142	22
IE	13	47	5	23	17	52	44	158
IT	47	47	18	12	38	29	121	132
LT	13	4	6	2	18	3	51	10
LU	183	74	50	19	155	64	387	263
NL	60	15	19	3	33	6	119	29
SE	51	30	14	9	41	15	147	88
SI	31	24	11	6	29	11	66	47
UK	81	84	35	29	81	90	208	264
Total	**1129**	**806**	**367**	**255**	**932**	**703**	**2710**	**2592**

Source: Ecorys analysis of PISA 2015 restricted (EU-18) dataset.

1.5 Factors tested in advanced empirical analysis

The table below sets out the variables that were considered for the analysis, but dropped due to various statistical concerns, such as collinearity or missing data.

Table A.1.2: Variables considered but excluded from the analysis

Level	Factor	Reason for Exclusion	Variable label
Student/ family	Duration Early Childhood	Missing data (>20%)	DUREC
	Age Arrived in Country	Missing data	SelfArr
	Aspirations	Subsumed within motivation scale	SelfAsp
	Parent Learning Support	Missing data	CURSUPP
	Parent Emotional Support	Missing data	EMOSUPP
	Parents Education	Collinear and part of ESCS	HISCED
	Parents Occupation	Collinear and part of ESCS	HISEI
	Home Resources	Collinear and part of ESCS	CULTPOS, HEDRES, HOMEPOS
School	Government Funding	Missing data	FeesFund, DonFund, OthFund
	Number of teachers	Collinear with school size	TOTAT
	Organisation running school	Missing data	OrgRun
	Leadership scales	Subsumed within LEAD (overall scale)	LEADCOM, LEADINST, LEADPD, LEADTCH
	Teacher qualifications	Missing data	PROAT5AB, PROAT5AM, PROAT6, PROATCE

Table A.1.3 provides descriptions and variable labels for the factors tested and included in the advanced empirical analysis. To aid interpretation of statistical tables, it was necessary to rename some variables. Where this was the case, we have provided the original PISA variable labels in parentheses. Similarly for composite variables, we provide the PISA labels for all variables included.

To deal with missing data (<20% of cases for a specific variable) Bayesian imputation was conducted.

Interaction effects were not included in the main statistical models due to small sample sizes in many analyses, which would have left the results questionable.

Table A.1.3: Descriptions and labels of factors included in advanced analysis

Level	Factor	Description	Variable label
Student/ family	Maths achievement	First plausible value of PISA assessment for maths (range 1-80)	PV1MATHS
	Economic, social and cultural status index	PISA-developed mean-standardized score from set of component variables: • Parental education (PARED) – highest education of parents in years; • Highest parental occupation (HISEI); • Home possessions (HOMEPOS). All three components are standardised to have a mean zero and standard deviation of one after imputation	ESCS
	Age	Age of student calculated as difference	AGE

		between year and month of testing and the year and month of the student's birth. (range 15.16-16.42)	
	Gender	Binary variable (1=female, 0=male)	GENDER (ST004D01T)
	Minority language status	Minority language student (OECD proxy definition). Binary variable (0=Language of test, 1=Other Language)	MINLANG (ST022Q01TA)
	Grade repetition	Student has repeated a grade. Recoded as a binary variable (1=repeated grade reported at least once, 0= no grade repetition reported at least once)	REPEAT
	Academic expectations	ISCED level student expects to complete. Treated as a continuous variable: 1. ISCED level 2 2. ISCED level 3B or C 3. ISCED level 3A 4. ISCED level 4 5. ISCED level 5B 6. ISCED level 5A or 6	EXPECT (ST111Q01TA)
	Motivation	PISA-developed mean-standardized score from set of component variables: - I want top grades in most or all of my courses; - I want to be able to select from among the best opportunities when I graduate; - I want to be the best, whatever I do; - I want to see myself as an ambitious person; - I want to be one of the best students in my class. Coded according to a four-point Likert scale (range: -3.0877 to 1.8543)	MOTIVAT
	Peers/Friends	Ecorys developed composite variable comprising mean of Friends and Lonely (reversed) items: - I feel like an outsider (or left out of things at school) at school - I make friends easily at school - I feel like I belong at school - I feel awkward and out of place in my school - Other students seem to like me - I feel lonely at school. Coded according to a four-point Likert scale	PEERS (ST034Q01TA + ST034Q02TA + ST034Q03TA + ST034Q04TA + ST034Q05TA + ST034Q06TA)
	Skipped or been late for school	Ecorys developed composite variable comprising mean of items asking how often skipped or been late for school in past 2 weeks: - Skipped a whole day of school - Skipped some classes - Arrived late for school	SKIPLATE (ST062Q01TA + ST062Q02TA + ST062Q03TA)
School	School size	Number of students in school	SCHSIZE
	Class size	Number of students in (average) class	CLSIZE
	Public or private school	Public or private operated school. Recoded binary variable (0=public, 1=private)	PUBPRIV (SC013Q01TA)
	School location	Treated as a continuous variable: 1. A village, hamlet or rural area (fewer than 3000 people);	LOCATE (SC001Q01TA)

		2. A small town (3000 to about 15,000 people); 3. A town (15,000 to about 100,000 people); 4. A city(100,000 to about 1,000,000 people); 5. A large city (with over 1,000,000 people).	
	Level of government funding	Percent total funding for school year that comes from government	GOVFUND (SC016Q01TA)
	Access to computers	Number of available computers per student (i.e. ratio) at modal grade	RATCMP1 (SC004Q02TA)
	Access to the internet	Number of available computers connected to the internet per student (i.e. ratio) at modal grade	RATCMP2 (SC004Q03TA)
	Extracurricular activity provided	Ecorys derived variable: count of following extracurricular activities offered by school: • Band, orchestra\choir • School play\musical • School yearbook, newspaper • Volunteering or service • Science club • Science competitions • Chess Club • Information\Communications Technology • Art Club\activities • Sport team\activities Range 0-10	XCURR (SC053Q01TA + SC053Q02TA + SC053Q03TA + SC053Q04TA + SC053Q05NA + SC053Q06NA + SC053Q07TA + SC053Q08TA + SC053Q09TA + SC053Q10TA)
	School Leadership	PISA-developed mean-standardized score from set of component variables answered by Principal: <u>Frequency of in the last academic year:</u> • I use student performance results to develop the school's educational goals • I make sure that the professional development activities of teachers are in accordance with the teaching goals of the school • I ensure that teachers work according to the school's educational goals • I promote teaching practices based on recent educational research • I praise teachers whose students are actively participating in learning • When a teacher has problems in his/her classroom, I take the initiative to discuss matters • I draw teachers' attention to the importance of pupils' development of critical and social capacities • I pay attention to disruptive behaviour in classrooms • I provide staff with opportunities to participate in school decision-making. • I engage teachers to help build a school culture of continuous improvement. • I ask teachers to participate in reviewing management practices	LEAD

		• When a teacher brings up a classroom problem, we solve the problem together • I discuss the school's academic goals with teachers at faculty meetings	
	School Autonomy	PISA-developed mean-standardized score from set of component variables (all binary): • Selecting teachers for hire • Firing Teachers • Establishing teachers' starting salaries • Determining teachers' salary increases • Formulating the school budget • Deciding on Budget allocations within the school • Establishing student disciplinary policies • Establishing student assessment policies • Approving students for admission to the school • Choosing which textbooks are used • Determining course content • Deciding which courses are offered.	SCHAUT
	Internal/self-evaluation	School undertakes evaluation. Categorical variable recoded to binary (0=No, 1=Yes this is mandatory OR yes based on school initiative)	INTSELFN (SC037Q01TA)
	Monitoring	Ecorys developed count of practices using student testing to monitor teachers in last academic year. Includes: • Tests or assessments of student achievement • Teacher peer review • Principal or senior staff observation lessons • Observation of classes by inspectors	MONITOR (SC032Q01TA + SC032Q02TA + SC032Q03TA + SC032Q04TA)
	Improvement	Ecorys developed count of improvement practices in school. Includes responses to: • External evaluation • Written specification of the schools curricular profile and educational goals • Written specification of student performance standards • Systematic recording of data such as attendance and professional development • Systematic recording of student test results and graduation rates • Seeking written feedback from students • Teacher mentoring • Consultation aimed at school improvement \ experts over a period of six months • Implementation of a standardised policy for science subjects	IMPROVE (SC037Q01TA + SC037Q02TA + SC037Q03TA + SC037Q04TA + SC037Q05NA + SC037Q06NA + SC037Q07TA + SC037Q08TA + SC037Q09TA + SC037Q10NA)
	Data	Ecorys developed count of practices using achievement data used for decisions.	DATA (SC036Q01TA +

		Includes responses to: • Achievement data are posted publically • Achievement data \ tracked over time \ admin • Achievement data \ provided to parents	SC036Q02TA + SC036Q03NA)
	Professional development	Percent of staff attended professional development	PROFDEV (SC025Q01NA)
	Teacher participation	PISA-developed count of factors on which teachers participate in decisions. Includes responses to: • Selecting teachers for hire • Firing Teachers • Establishing teachers' starting salaries • Determining teachers' salary increases • Formulating the school budget • Deciding on Budget allocations within the school • Establishing student disciplinary policies • Establishing student assessment policies • Approving students for admission to the school • Choosing which textbooks are used • Determining course content • Deciding which courses are offered	TEACHPART
	Study room provided	Room provided where students can do their homework. Recoded binary variable (0=no, 1=yes)	STUDRMN (SC052Q01NA)
	Staff help with homework	Staff help with homework. Recoded binary variable (0=no, 1=yes)	STUDHLPN (SC052Q02NA)
	School average ESCS	Ecorys developed average economic, social and cultural status index for students attending each school (calculated using ESCS variable)	SCHESCS

1.6 Approach to Country Groupings

In order to assess whether there are similarities (or potential differences) in the factors associated with academic resilience between Member States, we developed a specific approach to grouping Member States for this study.

Wößmann (2016) and our review of the literature highlight there are a number of country/institutional level factors that are associated with a student's academic achievement. The approach outlined below combines key factors to form groups of countries that are similar in these respects. The factors, derived from the PISA 2015 dataset, and the rationale for choosing to focus on each, were:

▪ The proportion of students within each Member State that attend a privately operated school. This is a measure of the level of public/private competition within a country.
▪ The average proportion of school funding provided by the government within each Member State. This is an additional measure of public/private sector competition.
▪ The average level of school autonomy in each Member State. This is a measure of the level of decision-making undertaken by schools.
▪ The proportion of students within each Member State that are subject to school assessments for retention and promotion. This is a measure of school accountability.

1.6.1 Approach

Countries may present very differently on the factors detailed above, making it difficult and unreliable to group them based on manual/intuition-based approaches. Therefore, we employed a data reduction technique designed to uncover subgroups (i.e. clusters) of observations in our case countries, based on the aforementioned factors. The specific method chosen was hierarchical clustering. This method was particularly suited to the task as it is logical and transparent, and enables potential solutions to be examined visually (see Figure A.1.1 below).

1.6.2 Results

A cluster is defined as a group of observations that are more similar to each other than they are to the observations in other groups. Each country starts, at the bottom of the dendrogram (see Figure A.1.1), as its own cluster. Clusters are then combined, based on their similarity, two at a time until all clusters are merged into one, at the top of the dendrogram. This is a bottom-up approach where countries are clustered based on their similarities.

Figure A.1.1: Cluster Dendrogram illustration of hierarchical clustering
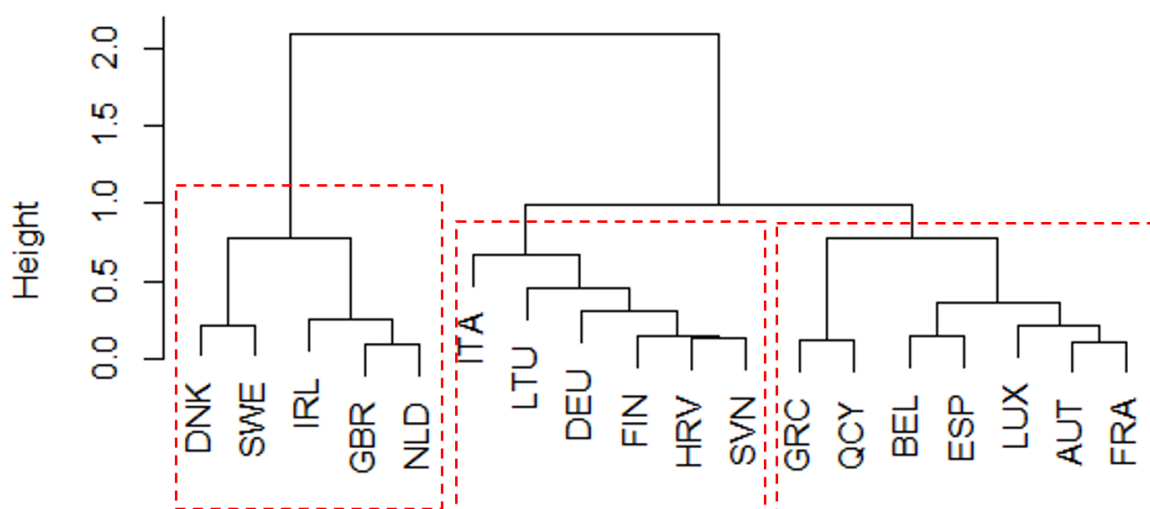
Based on the dendrogram, a 3 cluster solution was proposed, taking into account a range of considerations, including cluster sample sizes and the level of differentiation between each cluster (demonstrated by the length of the vertical lines leading to each cluster)[2]. The table below details the averages for these new country groupings (clusters).

Table A.1.4 details the Member State groupings, including the average values for the variables by which they were grouped. Regarding the proportion of overall funding schools received from government, all Member State groupings had similar average values (85%-88%). The country groupings are characterised as:

- **Member States Group 1** can be characterised, relative to other groups, as having medium levels (20%) of students that attend privately operated schools, lower levels (53%) of school autonomy and high levels of student assessments (86%). The total number of students in this group was 77,188.

---

2 The solution was validated via bootstrapping - the 3 clusters are stable.

- **Member States Group 2** had low levels (5%) of students that attend privately operated schools, medium-high levels of school autonomy (77%) and medium (65%) use of student assessments. The total number of students in this group was 41,177.
- **Member States Group 3** can be characterised as having high levels (42%) of students that attend a privately operated schools, high levels of school autonomy and less (41%) use of student assessments. The total number of students in this group was 36,805.

Table A.1.4 Average values for factors used to group Member States

Group	Private	Government funding	Autonomy	Assessment	Includes
1	19.9%	85.3%	52.6%	86.3%	AT, BE, CY, EL, ES, FR, LU
2	4.7%	87.6%	70.0%	64.8%	DE, FI, HR, IT, LT, SI
3	42.0%	88.2%	79.4%	40.8%	DK, IE, NL, SE, UK

2. Implementation and analysis of the classic approach

The study is concerned with how students, who face levels of adversity, are able to succeed in their education, relative to their peers who do not experience such adversity. To explore this, we adopted what can be considered a classic approach, the application of priori cut-offs around students' exposure to education-related adversity and their academic achievement. We focus on students' economic, social and cultural status as the education-related adversity factor this approach.

In this section, we explore the following groups of students, including their prevalence across EU Member States and the factors associated with group membership:

- **Resilient**: Students who are in the lowest quartile of economic, social and cultural status (ESCS) – they are considered socio-economically deprived - and are in the upper two quartiles (i.e. above average) of academic achievement, within their country. This was adopted as our primary approach recognising that students, particularly those with a migrant background, experiencing the lowest levels of ESCS but achieve above average achievement is a significant accomplishment. These students are deemed as academically **resilient**

- **Highly-resilient**: Students who are in the lowest quartile of ESCS and are in the top quartile academic achievement, within their country. These students are deemed as academically **highly-resilient**.

2.1 Analytical procedure

In order to identify academically resilient and highly-resilient (see above for full definitions), approaches that are reliant on defined "cut-offs", in the PISA dataset, quartiles were computed for the student level variables of the index of economic, social and cultural status (ESCS) and 1st plausible value for mathematics achievement. Table A.2.1 details how students were identified using the different approaches.

Table A.2.1: Identification of resilient and highly-resilient students in PISA

Definition	ESCS quartile	Mathematics achievement quartile(s)
Resilient	Lowest	Highest and second highest
Highly-resilient	Lowest	Highest

For each definition, students were identified within each country. In the case of the "resilient", this meant that, for each country, students were identified in the lowest quartile of ESCS and upper two quartiles of mathematics achievement for that country. Using this relative measure ensured that countries with varying levels of deprivation and achievement are represented. Failure to do this would have resulted in a bias towards countries with, relative to OECD average levels, high levels of social and economic deprivation.

2.2 Shares of migrant background students by Member State

Table A.2.2 details the shares of students by migrant background for each Member State. In all Member States, non-migrant background students accounted for the largest share of students.

Regarding second-generation students, Luxembourg had the greatest proportion (31%) followed by Germany (13%) and Austria (13%), whilst Slovakia, Bulgaria, Romania and Poland all had shares of less than 1%.

First-generation migrant students accounted for significant minorities in Luxembourg (21%), Ireland (11%) and Spain (9%). Latvia, Estonia, Slovakia, Bulgaria, Lithuania, Poland and Romania all had less than a 1% share.

In most cases, differences between the shares of second-generation and first-generation students within Member States can be considered statistically significant.

It is important to note that these statistics may not fully capture the extent of the most recent waves of immigration, as it is unlikely that many newly arrived refugees were integrated into education systems by the time that PISA 2015 took place. In addition, these statistics do not capture those students who left schooling before the age of 15 (the age at which PISA is conducted).

Table A.2.2: Share of students by migrant background and Member State

	Non-migrant			Second-generation			First-generation		
	Freq.	Weighted %	SE	Freq.	Weighted %	SE	Freq.	Weighted %	SE
AT	5,584	79.91	1.12	837	12.73	0.74	466	7.36	0.58
BE	7,754	82.51	0.91	755	8.84	0.57	761	8.65	0.62
BG	5,621	98.97	0.14	29	0.55	0.09	27	0.48	0.09
CY	4,705	88.75	0.38	178	3.25	0.26	492	8.01	0.33
CZ	6,526	96.68	0.33	114	1.6	0.21	108	1.72	0.23
DE	4,657	83.49	0.9	722	12.9	0.71	203	3.61	0.35
DK	5,264	89.47	0.56	1,282	7.78	0.49	361	2.75	0.19
EE	4,889	90.02	0.47	521	9.31	0.45	37	0.66	0.15
EL	4,888	89.24	0.73	357	6.98	0.52	170	3.79	0.44
ES	33,968	88.55	0.46	661	2.12	0.12	3,455	9.33	0.4
FI	5,557	96.1	0.44	103	1.77	0.26	122	2.12	0.25
FR	5,145	87.01	0.96	497	8.59	0.78	246	4.4	0.36
HR	5,012	89.2	0.61	505	9.03	0.52	100	1.78	0.2
HU	5,396	97.3	0.24	90	1.55	0.16	57	1.15	0.17
IE	4,719	85.67	0.98	176	3.32	0.29	577	11.01	0.83
IT	10,316	92.03	0.51	372	3.15	0.27	522	4.82	0.39
LT	5,996	98.23	0.16	185	1.38	0.13	36	0.39	0.1
LU	2,460	48.08	0.59	1,553	30.6	0.56	1,072	21.31	0.5
LV	4,539	94.94	0.41	200	4.06	0.38	43	1	0.14
MT	3,296	95.04	0.36	52	1.49	0.2	122	3.47	0.31
NL	4,637	89.34	0.92	443	8.56	0.81	111	2.1	0.24
PL	4,393	99.74	0.08	4	0.1	0.05	7	0.16	0.05
PT	6,737	92.67	0.42	186	3.28	0.24	235	4.05	0.33
RO	4,798	99.64	0.1	12	0.25	0.08	6	0.12	0.05
SE	4,357	83.02	1.14	494	9.73	0.78	373	7.25	0.64
SI	5,767	92.24	0.47	290	4.44	0.32	222	3.32	0.36
SK	6,077	98.81	0.15	35	0.61	0.11	34	0.58	0.1
UK	11,447	83.65	0.95	600	7.75	0.68	1,044	8.6	0.7

Source: Ecorys analysis of PISA 2015 EU-28 student dataset. N = 206,767. Missing = 14,056. Note: bold text indicates Member States where there is greater certainty that differences in shares of second-generation and first-generation students are statistically significant.

2.3 Deprivation by migrant background and Member State

Table A.2.3 details the shares of students, by migrant background, in the lowest ESCS quartile for each Member State. Key findings for Member State level deprivation are:

- The shares of non-migrant background students range from 10% in Luxembourg, to 27% in Estonia.
- Up to half of second-generation students were in the lowest quartile of deprivation in Greece, the Netherlands, France and Austria. Hungary and Malta had the lowest shares of deprived second-generation students, 8% and 10%, respectively.

- 63% of first-generation migrant students in Greece were deprived followed by France (49%), Slovenia (49%) and Italy (48%).

As denoted in bold text in Table A.2.3, many Member States had significantly higher shares of second-generation and first-generation students experiencing deprivation relative to their non-migrant background peers. There were also interesting differences between second-generation and first-generation students in multiple Member States.

Table A.2.3: Shares of students in the lowest quartile of ESCS by migrant background and Member State

	Non-migrant			Second-generation			First-generation		
	Freq.	Weighted %	SE	Freq.	Weighted %	SE	Freq.	Weighted %	SE
AT	1,106	**19.61**	**0.71**	403	47.53	2.1	210	46.1	3.23
BE	1,732	**22.56**	**0.69**	301	39.73	2.23	273	39.23	2.74
BG	1,399	25.67	1.18	8	32.63	9.26	5	16.75	6.58
CY	1,124	22.6	0.67	42	**22.75**	**3.27**	173	**34.09**	**1.87**
CZ	1,614	**26.82**	**0.87**	37	37.38	6.22	27	27.48	5.37
DE	1,022	**22.69**	**0.83**	296	41.67	2.08	74	36.16	3.67
DK	962	**17.21**	**0.84**	626	**42.34**	**2.34**	137	**30.06**	**3.23**
EE	1,211	27.38	0.88	139	**27.99**	**2.41**	7	**17.8**	**5.44**
EL	1,071	**23.68**	**1.22**	174	**50.41**	**3.21**	105	**62.92**	**3.72**
ES	7,828	**26**	**0.64**	245	37.93	2.8	1380	37.02	1.28
FI	1,344	**24.45**	**0.97**	47	46.48	4.31	52	43.47	4.72
FR	1,108	**22.23**	**0.86**	232	47.83	2.72	120	49.35	3.37
HR	1,189	**23.7**	**0.72**	175	33.52	2.39	37	36.86	5.44
HU	1,364	**26.84**	**0.92**	8	**8.15**	**2.86**	11	**18.56**	**6.21**
IE	1,188	24.99	1.14	40	22.08	2.88	132	21.99	2.21
IT	2,421	**25.48**	**0.89**	142	**36.44**	**3.74**	241	**48.32**	**3.28**
LT	1,525	24.88	0.87	28	16.33	3.27	5	25.85	12.86
LU	256	**10.49**	**0.64**	618	**39.73**	**1.07**	394	**36.65**	**1.26**
LV	1,156	**26.81**	**0.87**	36	18.03	2.81	6	16.05	6.29
MT	845	**26.69**	**0.69**	5	9.82	4.44	7	6.84	2.45
NL	1,022	**22.51**	**0.77**	220	49.08	2.73	51	45.8	3.71
PL	1,092	24.82	1.03	1	20.64	20.68	1	15.31	14.21
PT	1,719	20.28	0.88	24	**12.28**	**2.77**	49	**20.94**	**3.04**
RO	1,200	25.28	1.31	2	15.9	11.09	1	17.61	17.47
SE	927	**21.56**	**0.88**	193	**38.96**	**2.74**	179	**47.19**	**2.73**
SI	1,323	**19.2**	**0.57**	137	46.49	3.33	105	49.02	4.2
SK	1,504	25.42	0.88	11	**33.21**	**8.9**	7	**19.24**	**7.11**
UK	2,798	24.36	0.85	171	32.76	2.07	298	28.14	3.3

Source: Ecorys analysis of PISA 2015 EU-28 student dataset. N = 206,767. Missing = 14,056
Note: bold text for non-migrant background shares indicates Member States where there is greater certainty that differences to second-generation and/or first-generation students within that Member State are statistically significant. Bold text for second and first generation shares indicates Member States where there is greater certainty that differences in shares of second-generation and first-generation students are statistically significant.

2.4 Shares of resilient students

Table A.2.4 details the shares of resilient students (those in the lowest ESCS quartile and upper two quartiles of maths achievement) using the classic approach by migrant-background status across all 18 Member States retained for analysis. Proportions are based on just those students who are in the lowest quartile of ESCS. The shares of non-migrant background and second-generation resilient students were similar. There were significantly less first-generation resilient students.

Table A.2.4: Shares of resilient students using the classic approach

	Freq.	Weighted %	SE
Non-migrant background	10,443	32.48	0.55
Second-generation	1,129	30.4	1.49
First-generation	806	19.35	1.12

Table A.2.5 and Figure A.2.1 show the shares of resilient students for each EU Member State retained for advanced analysis. Proportions are based on just those students who are in the lowest quartile of ESCS. Particular caution is advised when making comparisons between and within Member States for second-generation and first-generation students. This is due to the smaller sample sizes on which statistics are based and, accordingly, sometimes large standard errors. The key points are:

- Higher shares of resilient second-generation students in France, Italy, Luxembourg and the UK relative to non-migrant background students.

- A greater proportion of resilient first-generation students than non-migrant and second-generation students than non-migrant background students in Ireland.

- Substantial shares of resilient migrant-background students in Cyprus, Ireland, Netherlands and the UK.

Table A.2.5: Shares of resilient students using the classic approach, by EU Member State

	Non-migrant			Second-generation			First-generation		
	Freq.	Weighted %	SE	Freq.	Weighted %	SE	Freq.	Weighted %	SE
AT	407	36.95	2.05	82	20.81	2.34	18	8.02	1.91
BE	571	31.23	1.28	67	20.79	2.7	39	13.7	2.05
CY	396	37.55	1.43	17	42.33	7.47	55	33.8	3.51
DE	363	34.81	1.76	88	27.33	2.92	14	18.22	4.56
DK	378	40.67	2.14	142	28.3	2.45	36	28.19	3.88
EL	391	32.98	2.4	52	27.45	4.32	27	23.88	4.49
ES	2,708	30.97	0.79	66	27.71	4.28	261	18.56	1.77
FI	460	34.07	1.48	9	18.81	6.08	5	10.47	4.42
FR	316	27.41	1.72	77	31.35	4.01	17	13.53	3.2
HR	444	36.53	1.78	50	27.91	3.57	9	25	7.19
IE	373	31.51	1.4	13	33.47	8.58	47	37.07	3.73
IT	919	31.96	1.71	47	33.96	5.49	47	21.17	3.94
LT	515	36.36	1.53	13	53.98	11.69	4	83.27	17.96
LU	73	28.49	2.85	183	29.38	1.76	74	18.67	2.13
NL	371	34.14	1.73	60	27.47	4.57	15	28.62	6.63
SE	329	34.96	1.55	51	26.89	3.48	30	17.78	2.8
SI	491	42.7	1.69	31	26.83	4.66	24	30.71	6.62
UK	938	36.1	1.5	81	44.57	3.77	84	25.96	4.44

Source: Ecorys analysis of PISA 2015 Restricted EU-18 student dataset (low ESCS only). N = 38,002.

Figure A.2.1: Shares of resilient students using the classic approach, by EU Member State
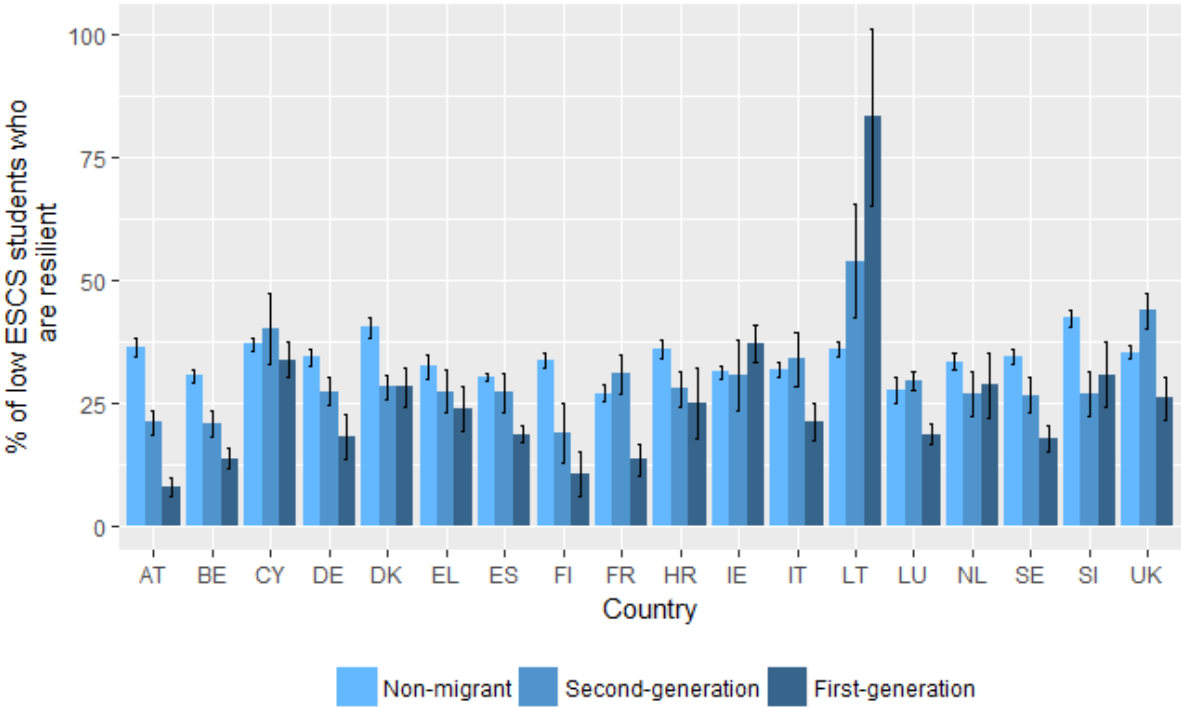
Source: Ecorys analysis of PISA 2015 Restricted EU-18 student dataset. N = 38,002 (lowest ESCS quartile only).

2.5 Shares of highly-resilient students

Table A.2.6 details the shares of low ESCS students identified as resilient using the highly-resilient definition by migrant background status. Relative to non-migrant background and second-generation students, there are, as a proportion, less first-generation students defined as highly-resilient.

Table A.2.6: Shares of highly-resilient students using the classic approach

	Freq.	Weighted %	SE
Non-migrant background	3,935	12.16	0.3
Second-generation	367	10.54	1.05
First-generation	255	5.56	0.5

Table A.2.7 and Figure A.2.2 show the shares of highly-resilient students for each EU Member State retained for advanced analysis. A level of caution is advised when making comparisons between and within Member States all students. This is due to the smaller sample sizes on which statistics are based and, accordingly, sometimes large standard errors. The key points are:

- France, Ireland, Italy, Luxembourg and the UK had higher shares of highly-resilient second-generation students relative to non-migrant background students.
- Cyprus, Greece and Ireland has shares of highly-resilient first-generation students that were similar or above the shares of non-migrant background students.

Table A.2.7: Shares of highly-resilient students using the classic approach, by EU Member State

	Non-migrant			Second-generation			First-generation		
	Freq.	Weighted %	SE	Freq.	Weighted %	SE	Freq.	Weighted %	SE
AT	167	15.25	1.44	20	4.88	1.28	3	1.59	0.83
BE	199	10.85	0.84	24	7.26	1.56	12	4.37	1.33
CY	142	13.25	1.06	2	5.41	4.03	17	11.5	2.64
DE	127	12.09	1.21	27	8.17	1.76	4	5.01	2.52
DK	128	14.03	1.45	46	8.23	1.44	11	6.16	2.09
EL	164	13.6	1.34	18	9.49	1.95	11	10.41	3.23
ES	1,068	11.91	0.55	22	8.39	2.66	83	5.37	0.9
FI	162	12.2	0.93	4	8.03	4.07	3	7	3.88
FR	114	9.59	1.05	25	10.45	2.46	4	2.89	1.39
HR	158	13.08	1.02	21	12.37	2.92	4	9.76	4.73
IE	124	10.37	1.06	5	14.17	6.17	23	18.17	3.29
IT	378	11.98	1.08	18	13.47	4.22	12	4.17	2.02
LT	181	13.3	1.17	6	26.01	10.31	2	26.42	22.7
LU	16	6.14	1.4	50	7.97	1.11	19	4.84	1.03
NL	168	14.87	1.37	19	9.91	2.83	3	5.65	3.35
SE	118	12.74	1.16	14	6.88	2.11	9	5.63	1.91
SI	181	17.02	1.37	11	10.95	3.38	6	9.98	4.32
UK	340	14.34	1.03	35	20.19	4.16	29	8.94	2.05

Source: Ecorys analysis of PISA 2015 Restricted EU-18 student dataset (low ESCS only). N = 38,002.

Figure A.2.2: Shares of Highly-resilient students using the classic approach, by EU Member State
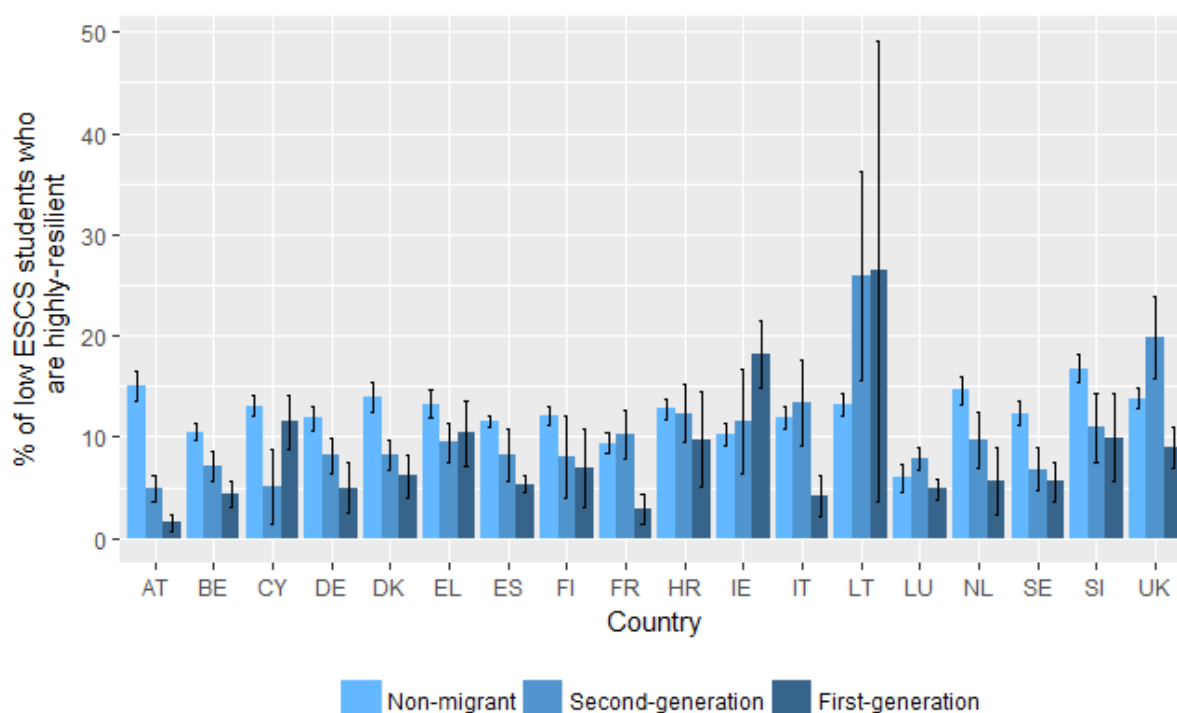
Source: Ecorys analysis of PISA 2015 Restricted EU-18 student dataset. N = 38,002 (lowest ESCS quartile only).

2.6 Factors associated with resilient status

To understand what student and school level factors are associated with students resilience status (lowest quartile of ESCS and upper two quartiles of maths achievement), derived with the classic approach, logistic regression was undertaken. The outcome variable is resilient (binary Y/N). To aid interpretation, all non-binary variables included in the model were standardised (mean = 0 and standard deviation = 1). To control for confounding at the country level, Member State was included in the model as a control variable. All models include PISA student and replicate weights, as per OECD guidance.

Table A.2.8 presents the regression results for resilience status for all migrant background students and then individually for second-generation and first-generation students. At the student level, statistically significant factors include:
- Higher academic expectations;
- Being male (due to the focus on mathematics achievement);
- Fewer instances of skipping or being late for school;
- Not repeating a grade; and for first-generation students only,
- Lower levels of motivation.
-

Significant factors at the school level include:
- Greater use of student testing to monitor teachers;
- Attending a larger school;
- Fewer school improvement practices in place; and for second-generation students only,
- Less school autonomy; and for first-generation students only,
- Greater levels of internal evaluation and proportion of funding from government.

Table A.2.8: All migrant background (student/family, school) predictors of resilient student status

	All migrant background					Second-generation					First-generation				
	Est.	SE	Est./SE	p	Sig.	Est.	SE	Est./SE	p	Sig.	Est.	SE	Est./SE	p	Sig.
Student factors															
AGE	0.050	0.038	1.304	0.201		0.095	0.051	1.867	0.070		-0.030	0.071	-0.425	0.674	
EXPECT	0.231	0.049	4.768	0.000	*	0.202	0.064	3.132	0.003	*	0.283	0.063	4.519	0.000	*
GENDER	-0.201	0.095	-2.114	0.042	*	-0.159	0.124	-1.282	0.208		-0.238	0.135	-1.756	0.088	
MINLANG	0.075	0.094	0.797	0.431		0.218	0.126	1.731	0.092		0.126	0.155	0.815	0.420	
MOTIVAT	-0.082	0.046	-1.776	0.084		-0.022	0.056	-0.388	0.701		-0.197	0.069	-2.872	0.007	*
PEERS	-0.062	0.042	-1.455	0.155		-0.092	0.058	-1.600	0.118		-0.062	0.055	-1.129	0.267	
REPEAT	-0.859	0.129	-6.647	0.000	*	-1.080	0.190	-5.690	0.000	*	-0.600	0.172	-3.493	0.001	*
SKIPLATE	-0.267	0.050	-5.318	0.000	*	-0.281	0.068	-4.131	0.000	*	-0.220	0.077	-2.846	0.007	*
School factors															
CLSIZE	0.057	0.048	1.171	0.250		0.038	0.072	0.536	0.595		0.077	0.069	1.122	0.269	
DATA	0.053	0.057	0.916	0.366		0.032	0.071	0.456	0.651		0.078	0.099	0.794	0.433	
GOVFUND	0.091	0.075	1.224	0.229		0.025	0.084	0.295	0.770		0.183	0.076	2.412	0.021	*
IMPROVE	-0.271	0.073	-3.716	0.001	*	-0.185	0.083	-2.222	0.033	*	-0.435	0.127	-3.415	0.002	*
INTSELFN	0.109	0.175	0.622	0.538		-0.164	0.201	-0.816	0.420		0.743	0.281	2.649	0.012	*
LEAD	0.082	0.049	1.648	0.108		0.073	0.065	1.131	0.266		0.084	0.075	1.109	0.275	
LOCATE	-0.034	0.043	-0.789	0.435		-0.061	0.062	-0.985	0.331		-0.042	0.061	-0.687	0.496	
MONITOR	0.165	0.076	2.182	0.036	*	0.244	0.100	2.444	0.020	*	0.083	0.114	0.727	0.472	
PROFDEV	-0.087	0.070	-1.237	0.224		-0.056	0.074	-0.753	0.457		-0.097	0.099	-0.982	0.333	
PUBPRIV	0.103	0.143	0.726	0.473		0.126	0.171	0.735	0.467		0.016	0.205	0.076	0.940	
RATCMP1	0.057	0.047	1.203	0.237		0.037	0.068	0.551	0.585		0.082	0.066	1.243	0.222	
RATCMP2	0.038	0.068	0.560	0.579		0.079	0.086	0.912	0.368		-0.027	0.067	-0.410	0.685	
SCHAUT	-0.128	0.070	-1.838	0.075		-0.183	0.087	-2.107	0.042	*	-0.017	0.112	-0.152	0.880	
SCHESCS	-0.146	0.125	-1.171	0.249		-0.168	0.162	-1.040	0.306		-0.216	0.142	-1.519	0.138	
SCHSIZE	0.095	0.043	2.216	0.033	*	0.060	0.053	1.143	0.261		0.119	0.073	1.626	0.113	
STUDHLPN	0.083	0.101	0.823	0.416		0.124	0.143	0.864	0.393		0.035	0.152	0.231	0.819	
STUDRMN	0.172	0.129	1.327	0.193		0.080	0.176	0.453	0.654		0.259	0.169	1.532	0.134	
TEACHPART	-0.049	0.056	-0.873	0.389		-0.080	0.076	-1.055	0.299		-0.002	0.073	-0.030	0.976	
XCURR	0.036	0.061	0.582	0.564		0.029	0.073	0.397	0.694		0.060	0.119	0.505	0.617	
Country controls															
BEL	0.002	0.181	0.011	0.991		0.089	0.234	0.380	0.707		0.357	0.287	1.245	0.222	
DEU	0.437	0.194	2.248	0.031	*	0.443	0.233	1.904	0.065		0.569	0.431	1.320	0.196	
DNK	0.460	0.191	2.415	0.021	*	0.452	0.223	2.027	0.050		0.726	0.385	1.884	0.068	
ESP	0.006	0.179	0.034	0.973		0.167	0.270	0.618	0.541		0.444	0.323	1.377	0.177	
FIN	0.220	0.331	0.665	0.511		0.521	0.434	1.199	0.239		0.127	0.594	0.214	0.832	

FRA	0.291	0.157	1.852	0.072		0.421	0.194	2.170	0.037	*	0.233	0.402	0.580	0.566	
GBR	0.129	0.216	0.598	0.554		0.376	0.246	1.529	0.135		0.366	0.372	0.982	0.333	
GRC	0.577	0.218	2.648	0.012	*	0.331	0.288	1.146	0.259		1.401	0.445	3.145	0.003	*
HRV	0.152	0.213	0.712	0.481		0.008	0.256	0.032	0.974		0.768	0.453	1.693	0.099	
IRL	-0.057	0.203	-0.283	0.779		-0.255	0.392	-0.649	0.520		0.625	0.358	1.748	0.089	
ITA	0.496	0.241	2.055	0.047	*	0.553	0.326	1.697	0.099		0.929	0.400	2.323	0.026	*
LTU	0.346	0.365	0.948	0.350		-0.063	0.381	-0.165	0.870		1.640	0.790	2.077	0.045	*
LUX	0.078	0.203	0.385	0.703		0.148	0.258	0.574	0.570		0.288	0.308	0.935	0.356	
NLD	0.498	0.243	2.053	0.048	*	0.501	0.274	1.828	0.076		0.915	0.453	2.017	0.051	
QCY	0.215	0.225	0.956	0.345		-0.361	0.341	-1.057	0.298		1.218	0.408	2.986	0.005	*
SVN	0.586	0.241	2.425	0.021	*	0.415	0.261	1.590	0.121		1.136	0.440	2.583	0.014	*
SWE	0.293	0.224	1.309	0.199		0.196	0.279	0.704	0.486		0.735	0.386	1.905	0.065	
(Intercept)	-2.565	0.272	-9.423	0.000	*	-2.225	0.304	-7.330	0.000	*	-3.813	0.412	-9.259	0.000	*
Pseudo R2	0.034					0.043					0.032				

In order to understand if the factors associated with resilient students differ between Member States and to account for national policy/education systems, regression analysis was rerun by the Member State groupings (detailed in section 1). Results are for all migrant background students only, due to low sample sizes for first-generation and second generation students.

Table A.2.9 details the regression results for all migrant background students by Member State grouping. At the student level, not repeating a grade was statistically significant across all groups. Additional significant factors for Member States Group 1 included students having higher academic expectations, fewer peers/friends, few instances of skipping or being late for school and being male (due to focus on mathematics achievement). Fewer instances of skipping or being late for school and being older were significant for Member States Group 2. Regarding Member States Group 3, no student factors other than not repeating a grade were statistically significant.

At the school level, significant factors associated with students in Member States Group 1 included greater levels of monitoring, attending a larger school and fewer school improvement practices in place. Significant factors in Member States Group 2 included attending a school with fewer school improvement practices in place and a school that undertakes internal evaluation. Higher proportion of school funding received from government and attending a school with lower average ESCS were associated with Member States Group 3.

Table A.2.9: All migrant background (student/family, school) predictors of resilient student status by Member State groupings

	MS Group 1 (AT, BE, CY, EL, ES, FR, LU)					MS Group 2 (DE, FI, HR, IT, LT, SI)					MS Group 3 (DK, IE, NL, SE, UK)				
	Est.	SE	Est./SE	p	Sig.	Est.	SE	Est./SE	p	Sig.	Est.	SE	Est./SE	p	Sig.
Student factors															
AGE	-0.017	0.068	-0.244	0.808		0.201	0.075	2.663	0.011	*	0.007	0.086	0.082	0.935	
EXPECT	0.315	0.076	4.162	0.000	*	0.128	0.101	1.273	0.209		0.090	0.076	1.184	0.242	
GENDER	-0.400	0.137	-2.917	0.005	*	-0.252	0.193	-1.306	0.198		0.009	0.206	0.041	0.967	
MINLANG	0.154	0.133	1.162	0.251		-0.133	0.185	-0.722	0.474		0.319	0.185	1.728	0.090	
MOTIVAT	-0.130	0.075	-1.734	0.090		-0.065	0.101	-0.642	0.524		0.025	0.103	0.245	0.808	
PEERS	-0.132	0.064	-2.084	0.043	*	-0.055	0.088	-0.623	0.536		-0.037	0.080	-0.468	0.642	
REPEAT	-1.056	0.158	-6.663	0.000	*	-0.516	0.247	-2.087	0.042	*	-0.682	0.253	-2.693	0.010	*
SKIPLATE	-0.354	0.087	-4.063	0.000	*	-0.253	0.084	-3.018	0.004	*	-0.136	0.076	-1.783	0.081	
School factors															
CLSIZE	0.121	0.066	1.818	0.076		0.002	0.119	0.013	0.990		-0.097	0.086	-1.127	0.265	
DATA	0.058	0.082	0.717	0.477		0.145	0.142	1.026	0.310		-0.007	0.098	-0.069	0.946	
GOVFUND	0.054	0.111	0.485	0.630		0.094	0.092	1.022	0.312		0.190	0.082	2.305	0.026	*
IMPROVE	-0.249	0.101	-2.479	0.017	*	-0.403	0.160	-2.529	0.015	*	-0.124	0.155	-0.799	0.428	
INTSELFN	-0.242	0.201	-1.201	0.236		0.603	0.283	2.131	0.038	*	0.561	0.365	1.536	0.131	
LEAD	0.061	0.073	0.843	0.404		0.029	0.098	0.291	0.772		0.084	0.080	1.045	0.301	
LOCATE	-0.099	0.057	-1.731	0.090		-0.104	0.105	-0.986	0.329		0.032	0.077	0.417	0.679	
MONITOR	0.177	0.082	2.146	0.037	*	0.266	0.163	1.637	0.108		0.035	0.124	0.278	0.782	
PROFDEV	-0.140	0.075	-1.861	0.069		0.040	0.122	0.330	0.743		-0.063	0.091	-0.693	0.492	
PUBPRIV	0.356	0.207	1.715	0.093		0.532	0.381	1.398	0.169		-0.073	0.178	-0.408	0.685	
RATCMP1	0.050	0.048	1.022	0.312		-0.045	0.112	-0.402	0.689		0.093	0.096	0.968	0.338	
RATCMP2	0.176	0.101	1.737	0.089		0.072	0.094	0.763	0.449		-0.192	0.130	-1.480	0.146	
SCHAUT	-0.194	0.101	-1.917	0.062		-0.225	0.171	-1.316	0.195		-0.050	0.104	-0.485	0.630	
SCHESCS	-0.222	0.185	-1.200	0.236		0.265	0.252	1.051	0.299		-0.458	0.207	-2.207	0.032	*
SCHSIZE	0.175	0.073	2.382	0.021	*	0.035	0.091	0.382	0.704		0.114	0.073	1.564	0.124	
STUDHLPN	-0.042	0.123	-0.338	0.737		0.126	0.213	0.590	0.558		0.268	0.284	0.946	0.349	
STUDRMN	0.238	0.169	1.406	0.166		-0.101	0.247	-0.409	0.684		0.208	0.333	0.625	0.535	
TEACHPART	0.094	0.084	1.114	0.271		-0.096	0.128	-0.748	0.458		-0.141	0.071	-2.002	0.051	
XCURR	0.045	0.097	0.469	0.641		0.106	0.127	0.832	0.410		-0.015	0.107	-0.138	0.891	
Country controls															
BEL	0.029	0.203	0.141	0.889											
ESP	-0.028	0.201	-0.141	0.888											
FIN						-0.116	0.357	-0.324	0.747						

FRA	0.223	0.204	1.094	0.280											
GBR											-0.301	0.259	-1.162	0.251	
GRC	0.649	0.270	2.407	0.020	*										
HRV						-0.351	0.290	-1.211	0.232						
IRL											-0.405	0.289	-1.398	0.168	
ITA						0.096	0.302	0.319	0.751						
LTU						-0.189	0.427	-0.443	0.660						
LUX	-0.063	0.259	-0.243	0.809											
NLD											0.080	0.307	0.260	0.796	
QCY	0.325	0.298	1.092	0.281											
SVN						0.301	0.288	1.044	0.302						
SWE											-0.246	0.232	-1.060	0.295	
(Intercept)	-2.262	0.291	-7.781	0.000	*	-2.379	0.347	-6.852	0.000	*	-2.964	0.760	-3.900	0.000	*
Pseudo r2	0.064					0.036					0.032				

2.7 Factors associated with highly-resilient status

To understand what student and school level factors are associated with students' highly-resilient status, derived with the classic approach, logistic regression was undertaken. The outcome variable is highly-resilient (binary Y/N). To aid interpretation, all non-binary variables included in the model were standardised (mean = 0 and standard deviation = 1). Country was included in the model as a control variable. All models include PISA student and replicate weights, as per OECD guidance.

Table A.2.10 presents the regression results for Resilient status for all migrant background students and then individually for second-generation and first-generation students. Statistically significant factors at the student level include:
- Higher academic expectations;
- Being older in ones cohort;
- Fewer peers/friends;
- Fewer instances of skipping or being late for school;
- Being male (due to focus on mathematics achievement);
- Not repeating a grade.

At the school level, significant factors include:
- Attending a school where a study room(s) are provided for students to complete homework;
- Lower levels of school autonomy;
- Fewer school improvement practices in place; and for first generation students only,
- Teachers helping with homework and being part of a larger class.

Table A.2.10: All migrant background (student/family, school) predictors of highly-resilient student status

	All migrant background					Second-generation					First-generation				
	Est.	SE	Est./SE	p	Sig.	Est.	SE	Est./SE	p	Sig.	Est.	SE	Est./SE	p	Sig.
Student factors															
AGE	0.169	0.073	2.334	0.025	*	0.191	0.102	1.882	0.068		0.112	0.114	0.983	0.332	
EXPECT	0.401	0.099	4.036	0.000	*	0.380	0.120	3.151	0.003	*	0.500	0.136	3.664	0.001	*
GENDER	-0.469	0.162	-2.889	0.007	*	-0.392	0.237	-1.652	0.107		-0.609	0.203	-3.007	0.005	*
MINLANG	0.123	0.160	0.767	0.448		0.390	0.223	1.747	0.089		0.017	0.201	0.087	0.931	
MOTIVAT	0.043	0.074	0.573	0.571		0.043	0.093	0.463	0.646		-0.002	0.116	-0.015	0.988	
PEERS	-0.141	0.066	-2.119	0.041	*	-0.223	0.082	-2.706	0.010	*	-0.027	0.123	-0.216	0.830	
REPEAT	-1.483	0.311	-4.763	0.000	*	-1.894	0.475	-3.988	0.000	*	-1.012	0.383	-2.642	0.012	*
SKIPLATE	-0.324	0.104	-3.111	0.004	*	-0.248	0.133	-1.857	0.072		-0.507	0.169	-2.999	0.005	*
School factors															
CLSIZE	0.001	0.095	0.013	0.990		-0.087	0.144	-0.607	0.548		0.222	0.094	2.359	0.024	*
DATA	0.054	0.105	0.517	0.608		0.097	0.134	0.723	0.474		-0.049	0.157	-0.310	0.759	
GOVFUND	-0.026	0.098	-0.267	0.791		-0.117	0.098	-1.191	0.242		0.104	0.119	0.875	0.388	
IMPROVE	-0.304	0.107	-2.851	0.007	*	-0.221	0.129	-1.717	0.095		-0.509	0.188	-2.706	0.010	*
INTSELFN	-0.108	0.247	-0.437	0.665		-0.275	0.282	-0.978	0.335		0.610	0.461	1.323	0.194	
LEAD	0.122	0.080	1.535	0.134		0.137	0.093	1.468	0.151		-0.002	0.124	-0.018	0.986	
LOCATE	-0.017	0.073	-0.237	0.814		-0.104	0.097	-1.073	0.291		0.074	0.102	0.732	0.469	
MONITOR	0.114	0.131	0.872	0.389		0.114	0.187	0.614	0.543		0.247	0.138	1.791	0.082	
PROFDEV	0.007	0.066	0.109	0.914		0.069	0.084	0.824	0.416		-0.104	0.118	-0.877	0.386	
PUBPRIV	0.407	0.229	1.773	0.085		0.349	0.278	1.254	0.218		0.488	0.273	1.790	0.082	
RATCMP1	-0.024	0.087	-0.281	0.780		-0.071	0.110	-0.646	0.523		0.075	0.113	0.666	0.509	
RATCMP2	0.030	0.086	0.351	0.728		0.105	0.110	0.954	0.347		-0.081	0.116	-0.697	0.491	
SCHAUT	-0.208	0.087	-2.378	0.023	*	-0.163	0.115	-1.417	0.165		-0.308	0.172	-1.794	0.081	
SCHESCS	0.071	0.215	0.331	0.742		-0.069	0.263	-0.264	0.794		0.257	0.285	0.902	0.373	
SCHSIZE	0.031	0.083	0.375	0.710		-0.010	0.100	-0.103	0.919		0.042	0.144	0.289	0.774	
STUDHLPN	0.040	0.152	0.263	0.794		-0.160	0.212	-0.754	0.456		0.602	0.249	2.415	0.021	*
STUDRMN	0.467	0.211	2.212	0.034	*	0.440	0.258	1.707	0.097		0.291	0.296	0.984	0.332	
TEACHPART	-0.062	0.045	-1.381	0.176		-0.078	0.053	-1.485	0.147		-0.026	0.070	-0.375	0.710	
XCURR	0.114	0.082	1.386	0.175		0.112	0.121	0.923	0.362		0.193	0.179	1.077	0.289	
Country controls															
BEL	0.201	0.341	0.591	0.558		0.317	0.400	0.792	0.433		0.869	0.762	1.139	0.262	
DEU	0.714	0.341	2.094	0.044	*	0.719	0.397	1.809	0.079		1.215	0.850	1.430	0.162	
DNK	0.536	0.378	1.416	0.166		0.564	0.394	1.433	0.161		1.091	0.882	1.237	0.224	
ESP	0.322	0.329	0.978	0.335		0.320	0.454	0.705	0.486		1.385	0.744	1.862	0.071	

FIN	1.070	0.541	1.979	0.056		1.017	0.793	1.282	0.208		1.888	1.067	1.770	0.085	
FRA	0.516	0.346	1.490	0.145		0.685	0.402	1.704	0.097		0.520	0.965	0.538	0.594	
GBR	0.293	0.351	0.835	0.409		0.685	0.427	1.602	0.118		0.657	0.674	0.975	0.336	
GRC	0.845	0.390	2.170	0.037	*	0.434	0.495	0.877	0.387		2.352	0.793	2.964	0.005	*
HRV	0.830	0.366	2.267	0.030	*	0.592	0.412	1.434	0.160		1.766	0.960	1.840	0.074	
IRL	0.337	0.378	0.893	0.378		0.017	0.687	0.025	0.980		1.447	0.719	2.013	0.052	
ITA	0.521	0.431	1.208	0.235		0.645	0.500	1.289	0.206		1.198	0.862	1.389	0.174	
LTU	0.859	0.537	1.599	0.119		0.528	0.602	0.877	0.386		2.458	1.078	2.281	0.029	*
LUX	0.095	0.390	0.244	0.809		0.140	0.465	0.302	0.765		0.712	0.747	0.954	0.347	
NLD	0.764	0.437	1.749	0.089		0.819	0.455	1.801	0.080		0.831	0.996	0.835	0.410	
QCY	-0.024	0.356	-0.068	0.946		-1.376	0.861	-1.598	0.119		1.176	0.786	1.497	0.143	
SVN	1.045	0.361	2.895	0.006	*	0.786	0.386	2.037	0.049	*	2.188	0.781	2.801	0.008	*
SWE	0.182	0.403	0.452	0.654		-0.155	0.504	-0.308	0.760		1.347	0.787	1.711	0.096	
(Intercept)	-3.814	0.384	-9.942	0.000	*	-3.389	0.459	-7.389	0.000	*	-5.856	0.867	-6.755	0.000	*
Pseudo r2	0.027					0.036					0.025				

In order to understand if the factors associated with highly-resilient students differ between Member states and to account for national policy/education systems, regression analysis was rerun by the Member State groupings (detailed in section 1). Results are for all migrant background students only, due to low sample sizes for first-generation and second generation students.

Table A.2.11 details the regression results for all migrant background students by Member State grouping. At the student level, statistically significant factors for Member States Group 1 included students having higher academic expectations, lower levels of peers/friends, being male (due to focus on mathematics achievement) and not repeating a grade. The only significant factor for Member States Group 2 was higher academic expectations. Regarding Member States Group 3, not repeating a grade, being older and less instances of skipping or being late for school were significant.

At the school level, significant factors associated with students in Member States Group 1 included attending a privately operated school, having access to a study room, greater levels of school leadership and fewer school improvement practices in place. Significant factors in Member States Group 2 included attending a school with fewer school improvement practices in place, less school autonomy and attending a school with higher average economic, social and cultural status (i.e. students are on average less deprived. There were no statistically significant factors at the school level associated with Member States Group 3.

Table A.2.11: All migrant background (student/family, school) predictors of highly-resilient student status by Member State groupings

	MS Group 1 (AT, BE, CY, EL, ES, FR, LU)					MS Group 2 (DE, FI, HR, IT, LT, SI)					MS Group 3 (DK, IE, NL, SE, UK)				
	Est.	SE	Est/SE	p	Sig.	Est.	SE	Est/SE	p	Sig.	Est.	SE	Est/SE	p	Sig.
Student factors															
AGE	0.121	0.111	1.089	0.282		0.106	0.152	0.693	0.491		0.329	0.141	2.340	0.024	*
EXPECT	0.422	0.157	2.679	0.010	*	0.380	0.167	2.276	0.027	*	0.257	0.157	1.641	0.107	
GENDER	-0.654	0.223	-2.938	0.005	*	-0.509	0.347	-1.466	0.149		-0.207	0.324	-0.639	0.526	
MINLANG	0.109	0.214	0.511	0.612		-0.017	0.367	-0.047	0.963		0.354	0.262	1.351	0.183	
MOTIVAT	-0.042	0.104	-0.404	0.688		0.210	0.142	1.485	0.144		0.097	0.156	0.618	0.540	
PEERS	-0.213	0.101	-2.110	0.040	*	-0.102	0.130	-0.788	0.434		-0.223	0.126	-1.773	0.083	
REPEAT	-1.824	0.316	-5.772	0.000	*	-0.968	0.558	-1.734	0.090		-1.859	0.647	-2.873	0.006	*
SKIPLATE	-0.338	0.183	-1.842	0.072		-0.209	0.174	-1.203	0.235		-0.491	0.196	-2.505	0.016	*
School factors															
CLSIZE	0.020	0.123	0.164	0.870		0.100	0.196	0.509	0.613		-0.152	0.156	-0.971	0.336	
DATA	0.151	0.139	1.082	0.285		0.048	0.259	0.184	0.855		-0.017	0.160	-0.106	0.916	
GOVFUND	-0.080	0.128	-0.626	0.534		-0.016	0.181	-0.087	0.931		0.114	0.122	0.932	0.356	
IMPROVE	-0.424	0.173	-2.448	0.018	*	-0.472	0.202	-2.338	0.024	*	0.004	0.210	0.020	0.984	
INTSELFN	-0.352	0.283	-1.246	0.219		0.400	0.531	0.754	0.455		0.141	0.512	0.276	0.784	
LEAD	0.327	0.124	2.634	0.011	*	-0.127	0.159	-0.798	0.429		0.079	0.128	0.618	0.539	
LOCATE	-0.152	0.105	-1.446	0.155		0.012	0.182	0.063	0.950		0.091	0.104	0.874	0.387	
MONITOR	0.024	0.156	0.152	0.880		0.546	0.277	1.968	0.055		-0.180	0.188	-0.959	0.343	
PROFDEV	0.056	0.118	0.475	0.637		0.109	0.175	0.625	0.535		0.003	0.097	0.034	0.973	
PUBPRIV	1.094	0.284	3.850	0.000	*	0.588	0.602	0.977	0.333		0.123	0.255	0.481	0.633	
RATCMP1	-0.007	0.095	-0.072	0.943		-0.090	0.277	-0.324	0.747		-0.065	0.162	-0.404	0.688	
RATCMP2	-0.037	0.110	-0.338	0.737		0.043	0.131	0.325	0.746		0.400	0.203	1.969	0.055	
SCHAUT	-0.230	0.144	-1.594	0.118		-0.654	0.260	-2.514	0.015	*	-0.096	0.164	-0.586	0.560	
SCHESCS	-0.366	0.247	-1.480	0.146		0.957	0.413	2.320	0.025	*	-0.111	0.332	-0.335	0.739	
SCHSIZE	0.180	0.144	1.254	0.216		-0.093	0.159	-0.588	0.560		0.076	0.132	0.578	0.566	
STUDHLPN	0.056	0.198	0.283	0.778		0.027	0.364	0.074	0.941		0.207	0.372	0.557	0.580	
STUDRMN	0.499	0.234	2.136	0.038	*	0.619	0.452	1.370	0.177		0.070	0.498	0.140	0.889	
TEACHPART	0.035	0.148	0.240	0.812		-0.153	0.171	-0.896	0.375		-0.150	0.116	-1.294	0.202	
XCURR	0.142	0.130	1.093	0.280		0.205	0.224	0.912	0.366		0.015	0.146	0.105	0.916	
Country controls															
BEL	0.087	0.384	0.226	0.822											
ESP	-0.063	0.400	-0.157	0.876											
FIN						0.435	0.732	0.594	0.555						

FRA	0.229	0.414	0.554	0.582											
GBR											0.117	0.375	0.311	0.757	
GRC	0.794	0.454	1.748	0.087											
HRV						-0.178	0.580	-0.306	0.761						
IRL											0.041	0.406	0.101	0.920	
ITA						-0.109	0.657	-0.166	0.869						
LTU						0.112	0.776	0.145	0.885						
LUX	-0.306	0.511	-0.599	0.552											
NLD											0.497	0.440	1.131	0.264	
QCY	0.089	0.407	0.218	0.828											
SVN						0.429	0.444	0.965	0.339						
SWE											-0.275	0.369	-0.744	0.460	
(Intercept)	-3.733	0.440	-8.491	0.000	*	-4.046	0.670	-6.042	0.000	*	-3.971	0.774	-5.128	0.000	*
Pseudo r2	0.039					0.035					0.026				

2.8 Factors associated with resilient schools

In order to maximise the information that can be gained about academic resilience, additional analysis, in the form of multilevel modelling, was conducted to explore the factors that are associated with "resilient" schools.

There is a major line of educational research that investigates 'effective schools'. Whilst our primary analysis focuses on student outcomes (i.e. students resilient status), the 'school effectiveness' research explores factors associated with effective and successful schools. We seek to contribute to this line of research from a resilience perspective - schools comprising larger numbers/proportions of resilient students. This requires us to model school-level or school-average resilience/highly-resilient and examine school-level predictors associated with it, which we did in the multilevel models.

2.8.1 Analytical procedure

Multilevel models included student, family, and school factors predicting individual and school-level resilience/highly-resilient status. Due to a large number of school predictors there were model convergence problems. Thus, we reduced the set of school predictors by running separate models for each of the 4 school factor sets (i.e. school structure; school management; teacher quality; equity and inclusion). We retained any school factor that significantly predicted achievement in these separate models. To ensure we did not overlook any potentially influential school factors, we ran these separate subset analyses for both resilient and highly-resilient status. This generated a final set of school factors as follows: school size, class size, public or private school, government funding, internet, autonomy, improvement, monitoring, data, teacher participation, study room, staff help, and migrant concentration. These school factors, along with the student/family factors (ESCS, achievement, age, gender, minority language status, grade repetition, academic expectations, motivation, peers/friends, and skipping or being late for school) were the final set of factors modelled as predictors of students' and schools' resilience and highly-resilient status.

Student level factors were entered as predictors of individual students' resilience and highly-resilient status at Level 1 and school factors were entered as predictors of school-level resilience and highly-resilient status at Level 2 (school), where school-level status was the proportion of resilient and highly-resilient migrants for that analysis in a given school. Analyses were conducted with Mplus 7.31 (Muthén & Muthén, 2015) and were weighted using the PISA student weight factor at Level 1 and the PISA school weight factor at Level 2. Probit regression was used and Weighted Least Squares with Means and Variance Adjusted (WSLMV) was used to estimate parameters. Results presented included the standardised beta coefficients (that can be interpreted as effect sizes for individual predictors), Level 1 and Level 2 multiple r square (proportion of variance explained by the predictor set), and Cohen's effect size for Level 1 and Level 2 multiple r square (where effect sizes of 0.02, 0.15, and 0.35 are considered small, medium, and large, respectively; Cohen, 1988). In these multilevel models we advise interpreting effects (particularly Level 2—school—effects) in the context of the relatively small numbers of resilient migrants in any given school.

2.8.2 Factors associated with resilient (student/school) status

Table A.2.12 shows student and school factors associated with individual student and school-average resilient status (using the classic approach) for students with a migrant background.

Findings are presented for all migrant background, second-generation and first-generation students. The total within- and between-level Cohen effect size (based on R square) for each set of analyses is .26 to .36 (medium to large). Here we emphasise significant predictors for all migrants, due to the larger samples within schools. At the student level, it is evident that student factors associated with individual resilience status are being older (β = .035, p<.01), being male (β = .053, p<.01) (due to focus on mathematics achievement), not repeating a grade (β = -.222, p<.001), having higher academic expectations (β = .110, p<.001), having lower motivation (β = -.066, p<.001), and having fewer instances of skipping or being late to school (β = -.099, p<.001).

School factors associated with school-level resilience status were larger school size (β = .198, p<.001), being public school (β = -.129, p<.01), having more computers connected to the Internet (β = .092, p<.05), greater school autonomy (β = .144, p<.01), using internal/self-evaluation in school management (β = .133, p<.001), using fewer school improvement practices (β = -.246, p<.001), using student achievement data for decisions (β = .087, p<.05), having less teacher participation in decision making (β = -.191, p<.001).

Table A.2.12: All migrant background (student/family, school) predictors of resilient student/school status

	All Migrants (n=20,694, schools=4146)				Second Generation (n=10,354, schools=2933)				First Generation (n=10,503, schools=3186)			
	Beta Est	**SE**	**Est/SE**	**p**	**Beta Est**	**SE**	**Est/SE**	**p**	**Beta Est**	**SE**	**Est/SE**	**p**
STUDENT-LEVEL												
AGE	**0.035**	0.013	2.704	0.007	**0.061**	0.018	3.461	0.001	0.002	0.019	0.132	0.895
GENDER	**0.053**	0.018	3.000	0.003	0.031	0.023	1.345	0.179	**0.097**	0.027	3.608	0.000
PARHERE	0.059	0.044	1.338	0.181	0.008	0.068	0.124	0.901	0.010	0.061	0.164	0.869
MINLANG1	0.020	0.018	1.104	0.270	**0.069**	0.029	2.389	0.017	0.005	0.029	0.175	0.861
REPEAT	**-0.222**	0.023	-9.580	0.000	**-0.312**	0.048	-6.522	0.000	**-0.170**	0.031	-5.526	0.000
EXPECT	**0.110**	0.018	5.981	0.000	**0.072**	0.029	2.482	0.013	**0.161**	0.027	6.075	0.000
MOTIVAT	**-0.066**	0.015	-4.518	0.000	**-0.046**	0.021	-2.177	0.029	**-0.079**	0.021	-3.806	0.000
PEERS	-0.027	0.015	-1.829	0.067	**-0.050**	0.020	-2.488	0.013	-0.029	0.020	-1.410	0.159
SKIPLATE	**-0.099**	0.015	-6.661	0.000	**-0.133**	0.019	-7.129	0.000	**-0.061**	0.023	-2.672	0.008
SCHOOL-LEVEL												
SCHSIZE	**0.198**	0.039	5.027	0.000	**0.222**	0.051	4.384	0.000	**0.169**	0.056	3.025	0.002
CLSIZE	0.026	0.043	0.614	0.539	0.000	0.054	-0.008	0.994	0.045	0.060	0.751	0.452
PUBPRIV	**-0.129**	0.042	-3.082	0.002	-0.048	0.052	-0.927	0.354	**-0.209**	0.066	-3.194	0.001
RATCMP2	**0.092**	0.040	2.277	0.023	**0.123**	0.055	2.224	0.026	0.033	0.053	0.623	0.533
SCHAUT	**0.144**	0.055	2.626	0.009	0.072	0.064	1.112	0.266	**0.189**	0.091	2.071	0.038
INTSELFN	**0.133**	0.037	3.548	0.000	0.055	0.047	1.161	0.245	**0.272**	0.063	4.322	0.000
IMPROVE	**-0.246**	0.049	-5.007	0.000	**-0.148**	0.064	-2.299	0.022	**-0.372**	0.074	-5.026	0.000
MONITOR	0.034	0.046	0.743	0.458	0.063	0.058	1.078	0.281	-0.107	0.067	-1.592	0.111
DATA	**0.087**	0.040	2.167	0.030	0.017	0.055	0.302	0.762	**0.216**	0.052	4.157	0.000
TEACHPART	**-0.191**	0.047	-4.097	0.000	**-0.269**	0.058	-4.637	0.000	-0.100	0.069	-1.448	0.148
PROFDEV1	-0.020	0.039	-0.514	0.607	-0.012	0.051	-0.242	0.809	0.061	0.056	1.102	0.271
MIGCONC	-0.005	0.021	-0.250	0.803	-0.016	0.035	-0.456	0.648	0.043	0.031	1.370	0.171
DV Threshold	1.492	0.024	62.389	0.000	1.412	0.032	43.878	0.000	1.596	0.037	42.563	0.000
Within R square	0.101				0.150				0.080			
Between R square	0.125				0.138				0.216			
Within Cohen ES	0.11				0.18				0.09			
Between Cohen ES	0.14				0.16				0.28			
Total Cohen ES	0.26				0.34				0.36			
Total Cohen Benchmark	Medium				Medium				Large			

2.8.3 Factors associated with highly-resilient (student/school) status

Table A.2.13 shows student and school factors associated with individual student and school-average highly-resilient status for students with a migrant background.

Findings are presented for all migrant background, second-generation and first-generation students. The total within- and between-level Cohen effect size (based on R square) for each set of analyses is .42 to .66 (large). Here we emphasise significant predictors for all migrants, due to the larger samples within schools. At the student level, it is evident that student factors associated with individual highly-resilient status are being older in one's cohort (β = .060, p<.01), being male (β = .137, p<.001) (due to focus on mathematics achievement), not repeating a grade (β = -.299, p<.001), having higher academic expectations (β = .185, p<.001), having fewer friends/peers (β = -.040, p<.05), and having fewer instances of skipping or being late for school (β = -.144, p<.001).

School factors associated with school-level highly-resilient status are a larger school size (β = .216, p<.001), being private school (β = .104, p<.05), using fewer school improvement practices (β = -.141, p<.05), using student testing to monitor teachers (β = .118, p<.05), and less teacher participation in decision making (β = -.242, p<.001).

Table A.2.13: All migrant background (student/family, school) predictors of highly-resilient student/school status

	All Migrants (n=20,694, schools=4146)				Second Generation (n=10,356, schools=2930)				First Generation (n=10,503, schools=3186)			
	Beta Est	**SE**	**Est/SE**	**p**	**Beta Est**	**SE**	**Est/SE**	**p**	**Beta Est**	**SE**	**Est/SE**	**p**
STUDENT-LEVEL												
AGE	**0.060**	0.019	3.072	0.002	**0.065**	0.027	2.431	0.015	**0.053**	0.027	1.963	0.050
GENDER	**0.137**	0.025	5.482	0.000	0.049	0.031	1.578	0.115	**0.284**	0.038	7.432	0.000
PARHERE	0.047	0.073	0.644	0.520	-0.104	0.105	-0.989	0.323	0.055	0.106	0.519	0.603
MINLANG1	-0.017	0.027	-0.619	0.536	**0.105**	0.042	2.481	0.013	-0.061	0.043	-1.414	0.157
REPEAT	**-0.299**	0.032	-9.448	0.000	**-0.501**	0.061	-8.268	0.000	**-0.235**	0.047	-4.967	0.000
EXPECT	**0.185**	0.027	6.877	0.000	**0.110**	0.039	2.808	0.005	**0.244**	0.043	5.645	0.000
MOTIVAT	-0.033	0.021	-1.581	0.114	-0.034	0.030	-1.124	0.261	**-0.069**	0.030	-2.281	0.023
PEERS	**-0.040**	0.020	-1.965	0.049	**-0.072**	0.027	-2.623	0.009	-0.048	0.030	-1.597	0.110
SKIPLATE	**-0.144**	0.023	-6.240	0.000	**-0.073**	0.031	-2.336	0.019	**-0.191**	0.037	-5.164	0.000
SCHOOL-LEVEL												
SCHSIZE	**0.216**	0.052	4.144	0.000	**0.229**	0.071	3.243	0.001	0.123	0.085	1.447	0.148
CLSIZE	0.023	0.054	0.423	0.672	0.067	0.066	1.010	0.312	0.010	0.101	0.102	0.919
PUBPRIV	**0.104**	0.052	2.005	0.045	0.075	0.060	1.257	0.209	**0.274**	0.130	2.102	0.036
RATCMP2	0.079	0.066	1.194	0.232	0.102	0.099	1.025	0.306	0.041	0.087	0.477	0.633
SCHAUT	-0.015	0.063	-0.242	0.808	0.015	0.074	0.205	0.837	-0.209	0.122	-1.715	0.086
INTSELFN	0.025	0.050	0.498	0.618	0.003	0.063	0.045	0.964	0.071	0.092	0.773	0.440
IMPROVE	**-0.141**	0.058	-2.453	0.014	**-0.153**	0.075	-2.048	0.041	-0.059	0.114	-0.515	0.606
MONITOR	**0.118**	0.058	2.049	0.040	0.082	0.071	1.154	0.248	0.147	0.127	1.154	0.248
DATA	0.027	0.051	0.529	0.597	0.056	0.066	0.853	0.394	0.091	0.098	0.926	0.354
TEACHPART	**-0.242**	0.059	-4.080	0.000	**-0.309**	0.075	-4.100	0.000	-0.107	0.109	-0.975	0.330
PROFDEV1	0.014	0.053	0.263	0.793	0.073	0.070	1.052	0.293	-0.094	0.105	-0.896	0.371
MIGCONC	-0.006	0.030	-0.188	0.851	**0.097**	0.046	2.098	0.036	**-0.279**	0.093	-2.995	0.003
DV Threshold	**2.181**	0.051	42.636	0.000	**2.027**	0.066	30.758	0.000	**2.351**	0.087	26.889	0.000
Within R square	0.211				0.284				0.251			
Between R square	0.133				0.184				0.247			
Within Cohen ES	0.27				0.40				0.34			
Between Cohen ES	0.15				0.23				0.33			
Total Cohen ES	0.42				0.62				0.66			
Total Cohen Benchmark	Large				Large				Large			

2.8 Classic approach applied to non-EU countries

To understand which student and school level factors are associated with students' resilience status within selected non-EU countries (AUS, CAN, NZL,USA), derived with the classic approach, logistic regression analysis was undertaken. Analysis was conducted on all migrant background students. The outcome variable was resilient (binary Y/N).

Table A.2.14 shows that, at the student level, statistically significant factors included:
- Higher academic expectations;
- Being older in ones cohort;
- Being male (due to focus on mathematics achievement);
- Fewer instances of skipping or being late for school;
- Not repeating a grade;
- Speaking a minority language at home.

Significant factors at the school level included:
- Use of student testing to monitor teachers;
- Publically operated school.

Table A.2.14: All migrant background (student/family, school) predictors of resilience status – non-EU countries

	All migrant background students			
	Beta Est	**SE**	**Est/SE**	**p**
AGE	**0.100**	0.038	2.604	0.009
GENDER	**0.122**	0.037	3.307	0.001
PARHERE	-0.001	0.038	-0.015	0.988
MINLANG	**0.195**	0.038	5.180	0.000
REPEAT	**-0.194**	0.051	-3.814	0.000
EXPECT	**0.123**	0.045	2.721	0.007
MOTIVAT	-0.004	0.042	-0.107	0.915
PEERS	-0.063	0.036	-1.736	0.083
SKIPLATE	**-0.080**	0.041	-1.965	0.049
SCHSIZE	-0.025	0.050	-0.504	0.614
CLSIZE	-0.072	0.047	-1.548	0.122
PUBPRIV	**-0.209**	0.051	-4.139	0.000
RATCMP2	-0.001	0.036	-0.035	0.972
SCHAUT	0.006	0.060	0.104	0.917
INTSELFN	-0.009	0.036	-0.239	0.811
IMPROVE	-0.009	0.071	-0.125	0.901
MONITOR	**0.118**	0.051	2.307	0.021
DATA	-0.103	0.058	-1.791	0.073
TEACHPART	0.044	0.048	0.923	0.356
PROFDEV1	0.004	0.038	0.108	0.914
MIGCONC	0.032	0.040	0.804	0.422
DV Threshold	6.772	2.098	3.228	0.001
R square	0.17			
Cohen ES	0.20			
Cohen Benchmark	Medium			

To understand which student and school level factors are associated with students' highly-resilient status, derived with the classic approach, regression analysis was undertaken. Analysis was conducted on all migrant background students. The outcome variable was resilient (binary Y/N).

Table A.2.15 shows that statistically significant factors at the student level included:
- Higher academic expectations;
- Being older in ones cohort;
- Fewer peers/friends;
- Being male (due to focus on mathematics achievement);
- Not repeating a grade;
- Speaking a minority language at home.

At the school level, significant factors associated with resilient student status included:
- Smaller class size;
- Use of internal evaluation;
- Less use of student testing to monitor teachers.

Table A.2.15: All migrant background (student/family, school) predictors of highly-resilient resilient status – non-EU countries

	All migrant background students			
	Beta Est	**SE**	**Est/SE**	**p**
AGE	**0.164**	0.048	3.424	0.001
GENDER	**0.224**	0.046	4.826	0.000
PARHERE	0.009	0.054	0.159	0.873
MINLANG	**0.183**	0.051	3.615	0.000
REPEAT	**-0.172**	0.077	-2.244	0.025
EXPECT	**0.134**	0.067	2.015	0.044
MOTIVAT	0.001	0.056	0.018	0.986
PEERS	**-0.087**	0.043	-2.006	0.045
SKIPLATE	-0.123	0.063	-1.948	0.051
SCHSIZE	0.080	0.057	1.400	0.162
CLSIZE	**-0.110**	0.055	-2.002	0.045
PUBPRIV	-0.099	0.055	-1.788	0.074
RATCMP2	-0.018	0.044	-0.399	0.690
SCHAUT	-0.004	0.072	-0.057	0.955
INTSELFN	**0.108**	0.033	3.259	0.001
IMPROVE	0.004	0.097	0.042	0.967
MONITOR	**-0.138**	0.061	-2.253	0.024
DATA	0.000	0.082	-0.005	0.996
TEACHPART	0.100	0.053	1.884	0.060
PROFDEV1	0.016	0.048	0.327	0.744
MIGCONC	-0.003	0.054	-0.056	0.956
DV Threshold	10.785	2.543	4.240	0.000
R square	0.22			
Cohen ES	0.28			
Cohen Benchmark	Medium			

2.9 Analysis of Academic Resilient and Highly-resilient Profiles

2.9.1 The importance of understanding profiles

Analyses in the preceding sections considered academically resilient migrants as one homogenous group and explored factors that predicted their resilience status and their achievement. This was a "variable-centred" approach where the focus was on the specific factors that were associated with resilience status or the achievement of resilient students. Variable-centred analyses are helpful for practice and policy intervention because they identify influential factors (e.g., school attendance, school leadership, etc.) to target in intervention efforts.

It is possible, however, that there are different ways of being academically resilient. Thus, rather than considering academically resilient migrants as one group, perhaps there are different profiles of academic resilience within this larger group. "Person-centred" analyses are a way to tease out distinct subgroups of academically resilient students. Person-centred analyses are helpful for practice and policy intervention because they identify particular students (or student groups) to target in intervention efforts. Analyses in this section used person-centred analytic methods to explore the extent to which there might be different profiles of academically resilient and highly-resilient migrants. Latent profile analysis (LPA) was the method used to do so.

2.9.2 Analytical approach

LPA is a person-centred approach to data analysis that provides complementary understanding to that gained from variable-centred approaches (e.g., logistic regression, multilevel models). Whereas variable-centred approaches tend to provide understanding of the sample-wide average in terms of relationships among variables, person-centred approaches allow for the identification of subgroups within the population that are alike on key variables (Bauer & Curran, 2004). Thus, person-centred approaches yield groups of individuals who have similar profiles with respect to particular variables.

For academic resilience, the two approaches can provide complementary understanding. As noted above, variable-centred approaches provide knowledge of the overarching predictors of resilience at a sample-wide average, whereas latent profile analysis identifies different ways of being resilient as per the unique characteristics of subgroups. Thus, for example, even though students may be in the lowest quartile of ESCS and the highest quartile of achievement (i.e., academically resilient), some students may have quite robust resilience profiles (and thus perhaps may continue to achieve highly at later points in school), whereas others may have slightly more precarious resilience profiles (and thus perhaps may be at risk of underachieving at a later point in school). Variable-centred analyses cannot identify such important distinctions and nuances, whereas person-centred analyses can.

LPA was conducted for three different groups:
- LPA among the resilient migrant students (n = 1935) to identify student profiles and school profiles of resilience.
- LPA among highly-resilient migrant students (n = 622) to identify student profiles and school profiles of highly-resilient.
- LPA among low-ESCS (or disadvantaged; n = 8056) to identify student profiles and school profiles of disadvantaged.

Following the identification of profiles, their links with mathematics achievement (the target achievement factor in this project) were also examined. To account for the PISA

survey design, student weights were applied (W_FSTUWT) in the LPA and follow-up analyses.

Factors tested in the LPA

Student factors used to identify profiles were the same as those used in the variable-centred analyses. School factors were identical to those used in the variable-centred analyses.

At the individual-level, gender, repeat, and minlang were entered as categorical variables. At the school-level, PubPriv, IntSelfn, STUDRMN, STUDHLPN were entered as categorical variables. As per the variable-centred analyses, all analyses are based on the restricted PISA dataset that only contains Member States where there were sufficient numbers of students to conduct robust analyses.

Determining the number of profiles

Table A.2.16. shows the results of the LPA tests for resilient student profiles. Solutions with between 1 and 5 profiles were run. Based the fit statistics and a preliminary examination of other solutions, a 3-profile solution was selected. Table A.2.17. shows the results of the LPA tests for school profiles. Solutions with between 1 and 5 profiles were run. Based on the selection of fit statistics, a 1-profile solution was chosen as no other solutions provided a considerable improvement in fit.

Table A.2.16. Fit statistics, entropy, and profile size for student profiles among resilient migrant background students

	Log-likelihood	BIC	SSA-BIC	pLMR	Entropy	Smallest profile frequency (Relative frequency)
1 profile	-17083.991	34266.364	34225.063	—	—	—
2 profiles	-16436.123	33038.739	32968.845	<.001	.97	872 (45%)
3 profiles	-15933.231	32101.065	32002.578	.07	.97	270 (14%)
4 profiles	-15556.420	31415.554	31288.473	.49	.99	268 (14%)
5 profiles	-14855.583	30081.992	29926.318	.36	.99	118 (6%)

Table A.2.17. Fit statistics, entropy, and profile size for school profiles among resilient migrant background students

	Log-likelihood	BIC	SSA-BIC	pLMR	Entropy	Smallest profile frequency (Relative frequency)
1 profile	-38587.524	77432.355	77324.336	—	—	—
2 profiles	-36371.730	73152.125	72980.566	.62	.99	399 (21%)
3 profiles	-35069.604	70699.230	70464.131	.76	.95	332 (17%)
4 profiles	-34327.798	69366.976	69068.336	.65	.96	38 (2%)
5 profiles	-33585.664	68034.064	67671.884	.78	.96	38 (2%)

Table A.2.18. shows the results of the LPA tests for highly-resilient student profiles. Solutions with between 1 and 4 profiles were run (the 5-profile solution ran into issues with model convergence indicating that this number of profiles was a stretch for the data). Based on the fit statistics and a preliminary examination of other solutions, a 2-

profile solution was selected. Table A.2.19. shows the results of the LPA tests for highly-resilient school profiles. Solutions with between 1 and 5 profiles were run. A 1-profile solution was chosen as no other solutions provided a considerable improvement in fit.

Table A.2.18. Fit statistics, entropy, and profile size for student profiles among highly-resilient migrant background students

	Log-likelihood	BIC	SSA-BIC	pLMR	Entropy	Smallest profile frequency (Relative frequency)
1 profile	-5399.594	10882.817	10841.544	—	—	—
2 profiles	-5057.322	10256.170	10186.323	.08	.99	210 (34%)
3 profiles	-4926.731	10052.884	9954.464	.66	.99	52 (8%)
4 profiles	-4737.949	9733.215	9606.222	.78	.99	52 (8%)

Table A.2.19. Fit statistics, entropy, and profile size for school profiles among highly-resilient migrant background students

	Log-likelihood	BIC	SSA-BIC	pLMR	Entropy	Smallest profile frequency (Relative frequency)
1 profile	-12282.683	24784.087	24676.142	—	—	—
2 profiles	-11325.914	22999.207	22827.765	.53	.99	139 (22%)
3 profiles	-10807.969	22091.976	21857.038	.57	.96	138 (22%)
4 profiles	-10523.389	21651.474	21353.039	.83	.97	92 (15%)
5 profiles	-10275.265	21283.886	20921.954	--	.97	15 (2%)

Table A.2.20. shows the results of the LPA tests for disadvantaged student profiles. Solutions with between 1 and 5 profiles were run. Based the fit statistics and a preliminary examination of other solutions, a 3-profile solution was selected. Table A.2.21. shows the results of the LPA tests for school profiles. Solutions with between 1 and 5 profiles were run. Based on fit statistics, a 1-profile solution was chosen.

Table A.2.20. Fit Statistics, entropy, and profile size for student profiles among disadvantaged migrants

	Log-likelihood	BIC	SSA-BIC	pLMR	Entropy	Smallest profile frequency (Relative frequency)
1 profile	-71516.021	143148.966	143107.654	—	—	—
2 profiles	-69630.751	139459.375	139389.463	<.001	.91	2999 (38%)
3 profiles	-68340.515	136959.850	136861.338	<.001	.90	2257 (28%)
4 profiles	-67831.608	136022.982	135895.870	.13	.89	334 (4%)
5 profiles	-65125.846	130692.406	130536.693	.048	.97	947 (12%)

Table A.2.21. Fit Statistics, entropy, and profile size for school profiles among disadvantaged migrants

	Log-likelihood	BIC	SSA-BIC	pLMR	Entropy	Smallest profile frequency (Relative frequency)
1 profile	-161574.618	323455.037	323346.991	—	—	—
2 profiles	-153196.041	306877.767	306706.166	.28	.99	1402 (17%)
3 profiles	-148034.733	296735.034	296499.877	.40	.93	1401 (16%)
4 profiles	-144694.552	290234.557	289935.843	.28	.94	160 (2%)
5 profiles	-142302.779	285630.893	285268.623	.50	.95	120 (1%)

2.9.3 Profiles of resilient migrant background students

Table A.2.22 shows the student profiles for resilient students (using the classic approach). For this group, three student profiles and one school profile were identified.

For the student profiles, profile 1 represents what we refer to as a robust resilient profile, profile 2 represents a precarious resilient profile, and profile 3 represents what we refer to as a vulnerable resilient profile. Significant differences between the three profiles were as follows:

- Students in the robust resilient profile tend to be female, students in the precarious resilient profile tend to be male or female, and students in vulnerable resilient profile tend to be male.
- Students in the robust and precarious resilient profiles were very unlikely to have repeated a grade, whereas students in the vulnerable profile were more likely to have repeated a grade.
- Students in the robust resilient profile had high academic expectations, whereas students in the precarious resilient profile had low expectations and students in the vulnerable resilient profile had very low academic expectations.
- Students in the robust resilient profile had above average levels of motivation, whereas for the precarious and vulnerable profiles these levels were below average.

There were no significant differences on the remaining student-level variables.

In sum, the vulnerable resilient profile evinced the least positive findings; however, the precarious resilient profile also evinced levels of expectations and motivation that were lower than the robust resilient profile.

No analyses are presented for the school profiles given that only one profile was identified.

Results indicated significant differences between the three student-level profiles in mathematics achievement. The robust resilient migrant profile reported the highest achievement (M = 556.56, SE = 2.49). This was followed by the precarious resilient migrant profile (M = 550.13, SE = 3.28), and finally the vulnerable resilient profile (M = 528.01, SE = 6.40). These results provide understanding about the different profiles of resilient that exist among the sample. Although all students had mathematics achievement within the upper two quartiles, the more adaptive profiles evinced significantly higher achievement within these quartiles.

Table A.2.22: Resilient migrant student profiles

Resilient Migrant Student Profiles		
Profile 1 **Robust resilient** (*n* = 1065; 55%)	**Profile 2** **Precarious resilient** (*n* = 600; 31%)	**Profile 2** **Vulnerable resilient** (*n* = 270; 14%)
• Average age (age) • **More likely to be female** (gender) • May or may not be a minority language student (minlang) • **Very unlikely to have repeated a grade** (repeat) • **High educational expectations** (expect) • **Above average motivation** (motivat) • Average peer relationship (peers) • Average levels of skipping or being late to school (skiplate)	• Average age (age) • **Male or female** (gender) • May or may not be a minority language student (minlang) • **Very unlikely to have repeated a grade** (repeat) • **Low educational expectations** (expect) • **Below average motivation** (motivat) • Average peer relationship (peers) • Average levels of skipping or being late to school (skiplate)	• Average age (age) • **More likely to be male** (gender) • May or may not be a minority language student (minlang) • **More likely to have repeated a grade** (repeat) • **Very low educational expectations** (expect) **Below average motivation** (motivat) • Average peer relationship (peers) • Average levels of skipping or being late to school (skiplate)

Note. Bolded text indicates significant differences between the profiles on that variable.

2.9.4 Profiles of highly-resilient migrant background students

Table A.2.23 shows the student profiles for highly-resilient students. For this group, two student profiles and one school profile were identified.

For the student profiles, profile 1 represents what we refer to as a robust highly-resilient profile, whereas profile 2 represents more of a precarious highly-resilient profile. Formal tests of comparison across the profiles showed three significant differences:
- Students in the robust highly-resilient profile tend to be older and either male or female, whereas students in the precarious highly-resilient profile tend to be younger and male.
- Students in the robust highly-resilient profile tend to have higher academic expectations than students in the precarious highly-resilient profile.

Other than these differences, the two profiles evinced similar levels of the remaining student-level variables.

In sum, aside from demographic factors, academic expectations was the main academic factor on which the two student profiles differed.

No analyses are presented for the school profiles given that only one profile was identified.

Results indicated no significant difference between the two student profiles in mathematics achievement (PV1MATH):
- the robust Resilient profile: M = 599.55, SE = 3.38
- the precarious Resilient profile: M = 595.54, SE = 3.25

It is important to note that this may be due to the fact that there was limited variance in achievement because all highly-resilient migrants by definition were in the highest quartile of achievement. It is also important to note that these analyses cannot speak to longer-term outcomes. The longer-term outcomes of the precarious highly-resilient

migrant profile may be impacted, for example, by the less positive levels of academic expectations (which may lead to lower educational attainment).

Table A.2.23: Highly-resilient migrant student profiles

Highly-resilient Migrant Student Profiles	
Profile 1 **Robust highly-resilience** **(n = 413; 66%)**	**Profile 2** **Precarious highly-resilience** **(n = 210; 34%)**
• **Older (age)** • **Male or female** (gender) • May or may not be a minority language student (minlang) • Unlikely to have repeated a grade (repeat) • **High educational expectations (expect)** • Average levels of motivation (motivat) • Average peer relationship (peers) • Average levels of skipping or being late to school (skiplate)	• **Younger (age)** • **More likely to be male (gender)** • May or may not be a minority language student (minlang1) • Unlikely to have repeated a grade (repeat) • **Low educational expectations (expect)** • Average levels of motivation (motivat) • Average peer relationship (peers) • Average levels of skipping or being late to school (skiplate)

Note. Bolded text indicates significant differences between the profiles on that variable.

2.9.5 Profiles of wider group of disadvantaged migrant background students

Table A.2.24 shows the student profiles of disadvantaged (lowest quartile of ESCS) migrant background students. We focus on this wider group of students as a means to add to the innovation of the study by being less reliant on cut-offs around achievement. For this group, three student profiles and one school profile were identified.

Among disadvantaged (low ESCS) migrant background students and their profiles, profile 1 represents a thriving profile, profile 2 represents a 'good-enough' profile, and profile 3 represents a vulnerable profile. Noteworthy differences between the three profiles include the following:
- Students in the thriving and good enough profiles tend to be female, whereas students in the vulnerable profile tend to be male.
- Students in the thriving profile are the least likely to have repeated a grade, followed by students in the good enough profile. In contrast, students in the vulnerable profile are more likely to have repeated a grade.
- Students in the thriving profile had very high academic expectations and above average motivation. Students in the good enough profile had lower levels (below average expectations, average motivation), and students in the vulnerable profile had even lower levels (low expectations, below average motivation).
- Students in the thriving and good enough profiles tend to report having average peer relationships and below average levels of skipping or being late to school. The reverse was true for students in the vulnerable profile (poorer peer relationships, above average levels of skipping or being late to school).

There were no significant differences in age or minority language status across the three profiles.

In sum, the vulnerable disadvantaged migrant profile evinced the least positive findings. The thriving disadvantaged migrant profile and the 'good enough' disadvantaged migrant profile evinced similar findings regarding gender, peers, and skipping or being late to school. However, the 'good enough' profile evinced levels of expectations and motivation that were significantly lower than the thriving disadvantaged migrant profile.

No analyses are presented for the school profiles given that only one profile was identified.

Results indicated significant differences between the three profiles in mathematics achievement. The thriving disadvantaged migrant profile scored the highest achievement (M = 469.49, SE = 3.51). This was followed by the 'good enough' disadvantaged migrant profile (M = 454.42, SE = 3.63), and then the vulnerable disadvantaged profile (M = 398.45, SE = 3.63).

These results provide understanding about the different profiles of disadvantage that exist among the sample. Because these differences cannot speak directly to resilient or highly-resilient migrants, class membership was also examined specifically among the resilient migrants and highly-resilient migrants within this larger sample. This indicated that for the highly-resilient migrants, 70% fell into the thriving disadvantaged migrant profile, 21% fell within the 'good enough' disadvantaged migrant profile, and 9% fell within the vulnerable disadvantaged migrant profile.

A similar story was found for the resilient migrants. For these students, 60% fell into the thriving disadvantaged migrant profile, 26% fell within the 'good enough' disadvantaged migrant profile, and 14% fell within the vulnerable disadvantaged migrant profile. Thus, it is clear from these distributions that resilient migrants and highly-resilient migrants tend to fall within the more adaptive profiles.

Table A.2.24: Disadvantaged migrant student profiles

Disadvantaged Migrant Student Profiles		
Profile 1 **Thriving disadvantaged migrants** (*n* = 2887; 36%)	**Profile 2** **'Good-enough' disadvantaged migrants** (*n* = 2257; 28%)	**Profile 2** **Vulnerable disadvantaged migrants** (*n* = 2912; 36%)
- Average age (age) **More likely to be female** (gender) - May or may not be a minority language student (minlang) **Very unlikely to have repeated a grade** (repeat) **Very high educational expectations** (expect) **Above average motivation** (motivat) **Average peer relationships** (peers) **Below average levels of skipping or being late to school** (skiplate)	- Average age (age) **More likely to be female** (gender) - May or may not be a minority language student (minlang) **Unlikely to have repeated a grade** (repeat) **Below average educational expectations** (expect) **Average motivation** (motivat) **Average peer relationships** (peers) **Below average levels of skipping or being late to school** (skiplate)	- Average age (age) **More likely to be male** (gender) - May or may not be a minority language student (minlang) **More likely to have repeated a grade** (repeat) **Low educational expectations** (expect) **Below average motivation** (motivat) **Poorer peer relationships** (peers) **Above average levels of skipping or being late to school** (skiplate)

Note. Bolded text indicates significant differences between the profiles on that variable.

2.9.6 Differences between profiles

For completeness, Table A.2.25 provides the means/proportions and the statistical significance for student variables across the profiles detailed above. All non-binary variables were standardised to aid interpretation (M = 0, SD = 1): age, expect, motivate, peers, skiplate. Binary variables were entered as is. With standardisation, means that are above zero indicate above average levels. The reverse is true for means below zero

(below average levels). Regarding binary variables, these indicate the proportions of students reporting a higher value (i.e., male for gender, yes for being a minority language student, yes for repeated a grade).

Table A.2.25. Means and proportions of student profile indicator variables, profile name, and profile size for resilient migrants, highly-resilient migrants, and disadvantaged migrants

		Resilient Migrants (n = 1935)				Highly-resilient Migrants (n = 622)			Disadvantaged Migrants (n = 8056)		
		Profile 1 Robust resilient migrants	Profile 2 Precarious resilient migrants	Profile 3 Vulnerable resilient migrants		Profile 1 Robust highly-resilient migrants	Profile 2 Precarious highly-resilient migrants		Profile 1 Thriving disadvantaged Migrants	Profile 2 'Good enough' disadvantaged Migrants	Profile 3 Vulnerable disadvantaged migrants
Age		0.014	0.014	-0.093		0.10[a]	-0.20[b]		-0.029	-0.018	0.049
Expect		0.836[a]	-0.749[b]	-1.725[c]		0.67[a]	-1.33[b]		1.196[a]	-0.22[b]	-1.111[c]
Motivat		0.175[a]	-0.24[b]	-0.147[b]		0.09	-0.17		0.257[a]	-0.046[b]	-0.24[c]
Peers		0.045	0.026	-0.255		0.07	-0.14		0.048[a]	0.056[a]	-0.107[b]
Skiplate		-0.026	-0.053	0.249		-0.04	0.08		-0.118[a]	-0.107[a]	0.236[b]
Gender (Male)		48%[b]	52%[a,b]	64%[a]		52%[a]	66%[b]		41%[a]	44%[a]	55%[b]
Minlang (yes)		52%	46%	49%		54%	43%		55%	54%	56%
Repeat (yes)		9%[b]	12%[b]	31%[a]		5%	7%		20%[c]	29%[b]	48%[a]
Profile size		1065 (55%)	600 (31%)	270 (14%)		413 (66%)	210 (34%)		2887 (36%)	2257 (28%)	2912 (36%)

Note. For each group of migrants, different superscript values indicate significant differences between profiles in the profile indicator variable means or proportions (at $p<.05$). If two means/proportions have the same superscript letter, they are not significantly different. If no superscript values are shown, then there were no significant differences on that variable.

3. Implementation and analysis of the clustering approach

Under the classic approach to academic resilience, students are identified as resilient using the application of cut-offs around an individual's Economic, Social and Cultural Status (ESCS) and achievement. In this case, students with low ESCS (i.e. deprived) that overcome this "adversity" (by achieving academically) are academically resilient.

This section focuses on an approach that is less reliant on a priori cut-offs and includes in contrast adversity variables beyond ESCS that impact on a student's achievement. The specific research questions this approach seeks to address are:

- Are there groups of students resilient to multiple forms of education-related adversity, additional to ESCS?
- Is it possible to identify groups of resilient students without a priori cut-offs around education-related adversity factors?
- What factors are associated with students' resilience to this multiple form adversity? And what additional information does this provide about the study of resilience?

To address these research questions, cluster analysis was employed. Cluster analysis is a data-reduction method designed to uncover subgroups (i.e. "clusters") of observations within a dataset. In our study, this is subsets of students within the PISA data. A cluster is defined as a subgroup of students that are more similar to each other than they are to students in other groups.

3.1 Analytical procedure

The steps to operationalise the clustering approach are:

1. Selection of education-related adversity factors that are important to identifying differences among groups of students within the data.

2. Cluster analysis: Determine number of clusters present in the data and assess whether the clustering approach has revealed a subgroup of students that can be deemed resilient to multiple education-related adversities

3. Examine the prevalence of clustering-derived resilience across EU Member States (i.e. the shares of students resilient to multiple education-related adversities) and the factors associated with this.

Each step and the results are discussed in turn below.

3.1.1 Step 1: Selection of education related adversity factors

The selection of education-related adversity factors, from which subgroups of students can be formed, started with a longlist of all those identified as important, in the context of academic resilience, in consultation with the European Commission. This list was then reviewed and reduced to take account of statistical considerations. Variables with high levels of missing data and those highly correlated or subsumed under composite variables were excluded in the interest of statistical robustness. The final set of factors is detailed in section 1.

The clustering approach is concerned with identifying subgroups of students, therefore only student level factors were considered for inclusion in the clustering approach. School level factors are explored in subsequent analysis (i.e. factors associated with multiple education-related adversities). Binary variables (e.g. gender) were not included in the variable selection process. This is due to the way distances between observations are

calculated[3] to determine the cluster they belong to and, related to the specific objective of the approach, avoiding the introduction of cut-offs around education-related adversities (e.g. just male/female student).

To determine which factors to prioritise in the clustering approach, variables were ranked by their importance (i.e. explanatory power) in predicting academic achievement. Figure A.3.1 details the importance[4] of each variable considered for inclusion in the clustering approach. It is clear that academic expectations and student-level ESCS have the greatest explanatory power in predicting achievement.

Figure A.3.1: Variable importance in predicting maths achievement (all students)
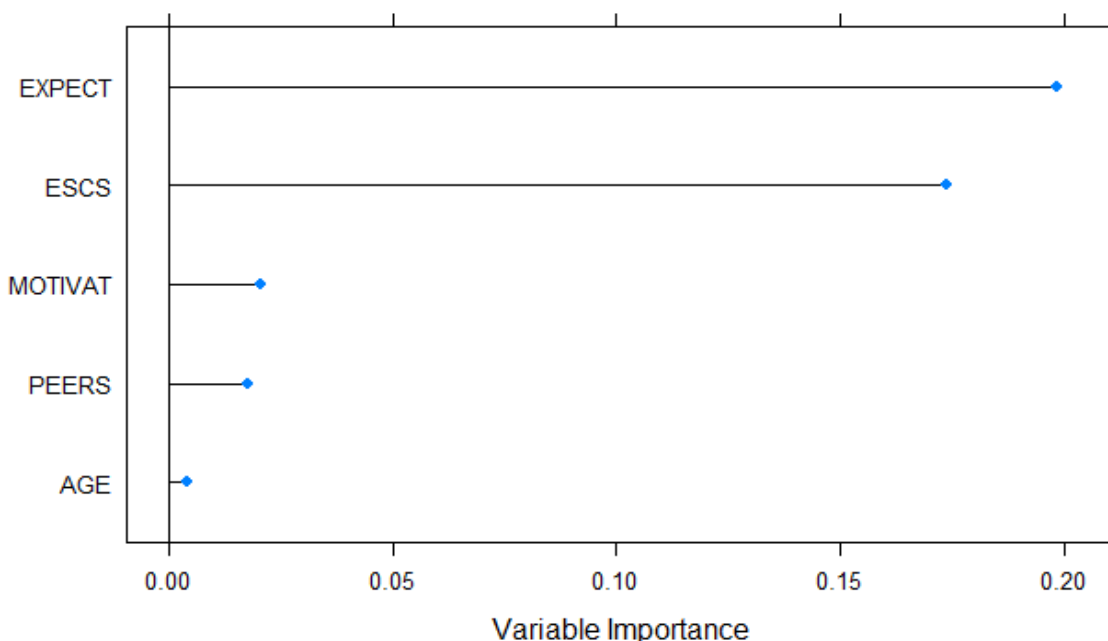
Following multiple attempts, including clustering with and without weights assigned to each variable, age was not included in the final clustering solution. This was due to the minimum threshold for cluster stability (see Step 3) not being met and the lack of importance of age, relative to other variables.

The final set of variables, that serve as the education-related adversity factors, included in the clustering approach are students':
- Academic expectations
- ESCS
- Motivation
- Peers/Friends

The hypothesis for each of the above four variables is a negative relationship with resilience; in other words those students that present lower on these, relative to other groups, are considered to be experiencing education-related adversity.

---

3   Euclidean distance measure was used. It is recommended not to include multiple data types with this method. Gower distance was considered but not pursued due to the approach objective and computational limitations.

4   Variable importance determined using recursive partitioning (regression tree) model. Values are the sum of reduction in the loss function (e.g. mean squared error) attributed to each variable at each split. For implementation see: https://topepo.github.io/caret/variable-importance.html

3.1.2 Step 2: Cluster analysis

Cluster analysis was conducted on all students in the top quartile of mathematics achievement with a view to identify a subgroup(s) that may experience greater levels of education-related adversity than other subgroup(s) i.e. students that achieve academically despite the presence of adversity.

Prior to cluster analysis, all variables were scaled (mean of 0 and SD of 1) by country (a recommended procedure for this type of analysis) and weighted based on their importance (see Figure A.3.1).

There are multiple clustering algorithms available, including hierarchical, partitioning based (e.g. K-means) and model based solutions, such as Gaussian finite mixture models. The algorithm selected was partitioning around medoids optimised for large datasets, as this provided the most stable/robust solution for the objective at hand[5] and is less sensitive to outliers than other methods.

Partitioning based methods require the number of clusters to be specified ex ante. Therefore, it is necessary to undertake cluster analysis with a range of clusters specified and then run diagnostics to determine the optimum number of clusters. The range of clusters tested was 1-10 and a two cluster solution was selected based on recognised measure to estimate the dissimilarity between clusters, the Silhouette Width. A higher Silhouette Width is preferred to determine the optimal number of clusters. Table A.3.1 details the Silhouette Width for each number of clusters tested.

Table A.3.1: Determining the number of clusters

Number of clusters	Silhouette Width
1	0
2	**0.339629**
3	0.124439
4	0.155182
5	0.126934
6	0.037346
7	0.02424
8	0.043574
9	-0.00067
10	-0.02344

Prior to accepting the two cluster solution, the results were validated via bootstrapping (1,000 runs). The two cluster solution was found to be highly stable (95%+).

Table A.3.2 details the proportions of students and descriptive statistics by cluster and migrant status. All statistics, excluding the raw frequency of students in each cluster, have been calculated using PISA student and replicate weights. It can be seen that cluster 2 have lower academic expectations, ESCS and motivation than cluster 1. Regarding peers, only non-migrant background students in cluster 2 had lower values than cluster 1, however, differences between clusters on this measure are generally small and, for migrant background students, not statistically significant.

Students in cluster 2 have slightly lower maths scores than those in cluster 1. This is to be expected as cluster 2 face relatively higher levels of education-related adversities. As students in cluster 2 are still in the top quartile of maths achievement within their

---

5   Gaussian finite mixture modelling, K-means and density based clustering were tested but did not produce subgroups that could be deemed as experiencing education-related adversity and/or stable solutions.

Table A.3.2: Shares of students and descriptive statistics by migrant status and cluster

	Cluster	Shares of students			Expectations		ESCS		Motivation		Peers		Maths achievement	
		Freq	Weighted %	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Non-migrant background	1	20,481	56.38	0.65	4.54*	0.02	1*	0.01	0.18*	0.01	3.21*	0.01	615.3*	0.58
	2	15,568	43.62	0.65	3.32*	0.03	-0.3*	0.01	-0.05*	0.01	3.13*	0.01	602.46*	0.52
Second-generation	1	670	38.61	2.59	4.6*	0.08	0.95*	0.04	0.56*	0.07	3.19	0.03	611.36*	3.52
	2	932	61.39	2.59	3.61*	0.09	-0.52*	0.04	0.22*	0.07	3.15	0.03	601.06*	2.37
First-generation	1	743	49.19	3.08	4.78*	0.05	0.96*	0.03	0.54*	0.06	3.06	0.04	608.38*	3.46
	2	703	50.81	3.08	3.95*	0.11	-0.53*	0.06	0.28*	0.08	3.08	0.03	599.02*	2.48

*Statistically significant at the 5% level.

3.1.3 Step 3: Students resilient using the clustering approach

With this approach, cluster 2 students are therefore defined as resilient. Table A.3.3 shows the shares of students resilient to multiple education-related adversities across Member States by student background. A greater proportion (11.6%) of non-migrant students are resilient compared to second-generation (10.4%) and first-generation students (6.7%)

Table A.3.3: Shares of students resilient according to the cluster approach

	Freq	Weighted %	SE
Non-migrant background	15,568	11.6	0.2
Second-generation	932	10.4	0.7
First-generation	703	6.7	0.5

Table A.3.4 and Figure A.3.2 detail the shares of resilient students by Member State and student background. Shares of students ranged considerably between Member States and student background. Particular caution is advised when making comparisons between Member States for statistically significant differences. This is due to the smaller sample sizes on which statistics are based and, accordingly, sometimes large standard errors. The key points are:

- The shares of non-migrant background resilient students ranged from 10% in Italy to almost 14% in Austria. As denoted by the standard errors, not all differences between Member States can be considered meaningful. For example, Austria has a significantly higher proportion of resilient non-migrant background students than Belgium but the same cannot be said for Member states with shares closer to Austria such as Germany and the United Kingdom (both around 13%) due to uncertainty around the estimated proportion.
- Regarding second-generation students, shares ranged from 5% in Austria, to 15% in the United Kingdom.
- Cyprus has the highest share of resilient first-generation migrants (10%) and Austria the lowest (3%).
- Differences within Member States, typically, followed the trend of the greatest share of resilient students having a non-migrant background followed by second-generation and then first-generation students. Interesting exceptions to this included Cyprus, where the shares of resilient students are fairly similar and the United Kingdom, Croatia and Slovenia where the proportion of second-generation resilient students are higher (or at least similar after accounting for statistical error) than non-migrant background students.

Table A.3.4: Shares of students resilient using the cluster approach, by Member State

	Non-migrant background			Second-generation			First-generation		
	Freq.	Weighted %	SE	Freq.	Weighted %	SE	Freq.	Weighted %	SE
AT	782	13.83	0.72	47	5.43	1.12	13	2.69	0.75
BE	887	11.22	0.45	61	7.42	1.07	43	5.64	0.86
CY	504	10.95	0.49	17	9.59	2.04	46	10.19	1.24
DE	633	13.28	0.61	76	10.12	1.26	9	4.1	1.31
DK	598	11.76	0.54	91	9.09	1.6	18	3.34	0.88
EL	526	10.25	0.7	39	9.75	1.52	14	7.83	2.23
ES	3,995	10.71	0.28	60	8.53	1.75	259	6.56	0.53
FI	612	11.11	0.5	7	6.31	2.49	8	7.25	2.64
FR	603	11.33	0.63	53	10.35	1.78	14	5.54	1.44
HR	601	11.94	0.62	69	13.65	1.73	9	8.24	2.84
IE	540	11.52	0.54	17	9.5	2.08	52	8.84	1.03
IT	1,312	10.03	0.55	38	10.05	2.58	29	6.34	1.51
LT	596	10.35	0.51	18	11.48	3.24	3	7.89	5.87
LU	318	12.81	0.65	155	9.86	0.75	64	5.89	0.79
NL	550	11.29	0.58	33	7.69	1.68	6	5.2	2.62
SE	517	11.83	0.59	41	8.01	1.49	15	4.18	1.23
SI	683	13.04	0.61	29	14.14	2.67	11	7.55	2.55
UK	1,311	13.28	0.55	81	15.02	2.89	90	9.49	1.5

Source: Ecorys analysis of PISA 2015 Restricted EU-18 student dataset. N = 152,576.

Figure A.3.2: Shares of students resilient using the cluster approach, by Member State
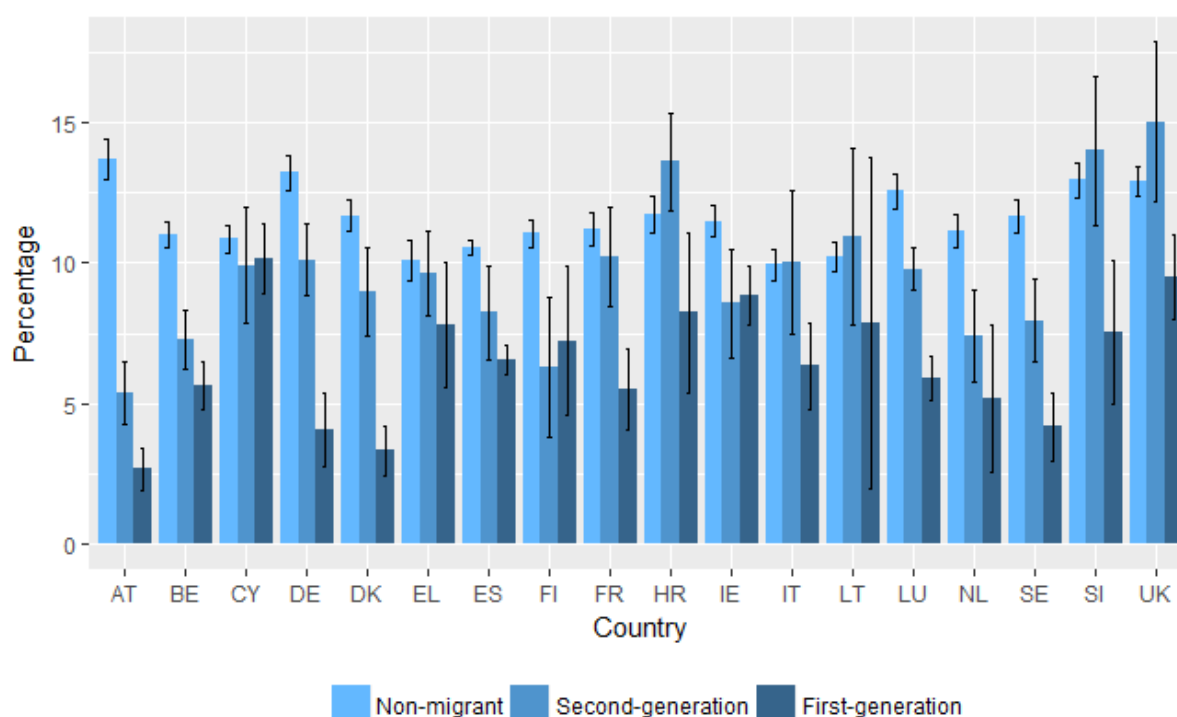
3.2 Factors associated with clustering-derived resilience

To understand which student and school level factors are associated with clustering-derived resilience, logistic regression was undertaken. The outcome variable is clustering-derived resilient (binary Y/N). To aid interpretation, all non-binary variables included in the model were standardised (mean = 0 and standard deviation = 1).

Country was included in the model as a control variable. All models include PISA student and replicate weights, as per OECD guidance.

Table A.3.5 presents the results for regressions run on all migrant background students and then individually for second-generation and first-generation students. Statistically significant student level factors associated with a cluster definition of resilience include the following: higher academic expectations, less prone to skipping or being late for school, low ESCS, being male, and not repeating a grade. These factors are fairly consistent across second-generation and first-generation students.

At the school level, statistically significant factors included attending a school where the average ESCS of students is higher (i.e. students are typically from a less deprived background) and having a study room in the school where students can complete their homework. Regarding first-generation students, being part of a larger than average class also had a positive association with being resilient according to the cluster definition.

Table A.3.5: All migrant background (student/family, school) predictors of clustering-derived resilience status

	All migrant background students					Second-generation students					First-generation students				
	Est.	SE	Est./SE	P	Sig.	Est.	SE	Est./SE	P	Sig.	Est.	SE	Est./SE	P	Sig.
Student factors															
AGE	0.044	0.046	0.953	0.347		0.071	0.059	1.196	0.240		0.007	0.066	0.100	0.921	
ESCS	-0.613	0.048	-12.718	0.000	*	-0.663	0.062	-10.669	0.000	*	-0.525	0.070	-7.515	0.000	*
EXPECT	0.423	0.068	6.260	0.000	*	0.403	0.076	5.338	0.000	*	0.467	0.110	4.247	0.000	*
GENDER	-0.799	0.118	-6.784	0.000	*	-0.720	0.153	-4.722	0.000	*	-0.969	0.174	-5.569	0.000	*
MINLANG	-0.001	0.098	-0.011	0.991		0.077	0.128	0.599	0.553		0.031	0.124	0.246	0.807	
MOTIVAT	0.049	0.047	1.052	0.300		0.044	0.054	0.821	0.417		0.065	0.090	0.725	0.474	
PEERS	0.044	0.053	0.833	0.411		0.016	0.073	0.214	0.832		0.065	0.072	0.896	0.376	
REPEAT	-1.740	0.213	-8.177	0.000	*	-1.624	0.287	-5.650	0.000	*	-1.803	0.234	-7.698	0.000	*
SKIPLATE	-0.283	0.065	-4.352	0.000	*	-0.276	0.075	-3.686	0.001	*	-0.285	0.098	-2.906	0.006	*
School factors															
CLSIZE	0.092	0.049	1.868	0.070		-0.004	0.076	-0.053	0.958		0.224	0.053	4.258	0.000	*
DATA	0.036	0.080	0.448	0.657		0.045	0.107	0.419	0.678		0.024	0.101	0.242	0.811	
GOVFUND	0.025	0.060	0.415	0.681		-0.001	0.088	-0.010	0.992		0.050	0.081	0.615	0.543	
IMPROVE	-0.174	0.094	-1.864	0.071		-0.151	0.113	-1.337	0.190		-0.231	0.133	-1.736	0.092	
INTSELFN	0.199	0.195	1.021	0.315		0.170	0.227	0.750	0.459		0.299	0.284	1.054	0.299	
LEAD	-0.030	0.060	-0.501	0.620		0.039	0.078	0.495	0.624		-0.164	0.096	-1.712	0.096	
LOCATE	-0.102	0.059	-1.716	0.095		-0.130	0.077	-1.674	0.103		-0.095	0.066	-1.430	0.162	
MONITOR	0.036	0.093	0.384	0.703		0.038	0.133	0.285	0.777		0.057	0.102	0.560	0.579	
PROFDEV	0.021	0.067	0.311	0.758		0.016	0.081	0.193	0.848		0.081	0.096	0.847	0.403	
PUBPRIV	0.275	0.218	1.259	0.217		0.437	0.277	1.576	0.124		-0.037	0.236	-0.156	0.877	
RATCMP1	-0.051	0.063	-0.812	0.422		-0.116	0.090	-1.294	0.205		0.071	0.087	0.816	0.420	
RATCMP2	0.091	0.072	1.256	0.218		0.139	0.100	1.386	0.175		0.014	0.101	0.137	0.892	
SCHAUT	-0.122	0.086	-1.415	0.166		-0.094	0.105	-0.894	0.378		-0.184	0.120	-1.530	0.135	
SCHESCS	1.295	0.165	7.831	0.000	*	1.368	0.213	6.436	0.000	*	1.227	0.179	6.870	0.000	*
SCHSIZE	-0.042	0.068	-0.622	0.538		-0.107	0.078	-1.369	0.180		0.035	0.090	0.385	0.702	
STUDHLPN	-0.028	0.110	-0.250	0.804		0.015	0.153	0.098	0.923		-0.064	0.156	-0.412	0.683	

STUDRMN	0.531	0.128	4.144	0.000	*	0.602	0.181	3.323	0.002	*	0.343	0.156	2.194	0.035	*
TEACHPART	-0.076	0.070	-1.090	0.283		-0.121	0.074	-1.631	0.112		0.010	0.120	0.086	0.932	
XCURR	0.019	0.090	0.215	0.831		0.032	0.120	0.267	0.791		0.066	0.087	0.752	0.457	
Country controls															
BEL	0.410	0.181	2.263	0.030	*	0.299	0.229	1.307	0.200		0.851	0.373	2.284	0.029	*
DEU	0.797	0.228	3.494	0.001	*	0.802	0.239	3.352	0.002	*	0.568	0.514	1.106	0.277	
DNK	-0.156	0.296	-0.526	0.602		-0.176	0.327	-0.537	0.595		-0.389	0.501	-0.776	0.443	
ESP	1.409	0.239	5.896	0.000	*	1.336	0.333	4.007	0.000	*	1.789	0.418	4.282	0.000	*
FIN	0.154	0.442	0.349	0.729		-0.188	0.639	-0.293	0.771		0.709	0.632	1.122	0.270	
FRA	0.679	0.274	2.479	0.018	*	0.733	0.316	2.322	0.026	*	0.783	0.518	1.513	0.140	
GBR	0.569	0.238	2.388	0.023	*	0.599	0.344	1.742	0.091		0.860	0.425	2.027	0.051	
GRC	0.492	0.312	1.577	0.124		0.425	0.370	1.151	0.258		0.907	0.541	1.677	0.103	
HRV	1.361	0.284	4.797	0.000	*	1.392	0.317	4.394	0.000	*	1.192	0.580	2.057	0.047	*
IRL	0.321	0.225	1.423	0.164		0.180	0.337	0.533	0.597		0.888	0.403	2.203	0.034	*
ITA	0.743	0.286	2.599	0.014	*	0.862	0.381	2.260	0.030	*	0.892	0.441	2.022	0.051	
LTU	1.108	0.365	3.037	0.005	*	1.010	0.426	2.372	0.024	*	1.529	0.909	1.682	0.102	
LUX	0.551	0.216	2.552	0.015	*	0.629	0.292	2.154	0.038	*	0.512	0.400	1.282	0.209	
NLD	-0.024	0.332	-0.071	0.944		-0.071	0.333	-0.215	0.831		0.048	0.759	0.063	0.950	
QCY	0.480	0.258	1.859	0.072		0.071	0.383	0.186	0.853		0.943	0.424	2.223	0.033	*
SVN	0.904	0.266	3.401	0.002	*	1.033	0.306	3.376	0.002	*	0.846	0.482	1.757	0.088	
SWE	-0.321	0.304	-1.056	0.299		-0.375	0.339	-1.106	0.276		-0.124	0.535	-0.232	0.818	
(Intercept)	-3.376	0.278	-12.125	0.000	*	-3.433	0.328	-10.460	0.000	*	-3.598	0.465	-7.738	0.000	*
Pseudo r2	0.093					0.107					0.081				

In order to understand if the factors associated with student resilience differ between Member states and to account for national policy/education systems, regression analysis was rerun by the Member State groupings (detailed in section 1 of this Annex). Results are for all migrant background students only, due to low sample sizes for first-generation and second generation students.

Table A.3.6 details the regression results for all migrant background students by Member State grouping. At the student level, statistically significant factors are similar across country groupings and the results for all member states (see Table A.3.5 above). Students having higher academic expectations was more prominent (in terms of estimate size) for group 1 member states. Having higher motivation was significant for students in group 3.

At the school level, attending a school with higher average levels of ESCS was a consistent positive factor across groupings (to varying degrees). There were some interesting differences. Statistically significant factors included:
- lower levels of school autonomy was significant in groups 1 and 2;
- attending a privately operated school for group 1;
- Having a study room where students can do their homework, larger class sizes greater levels of monitoring, and less school directed leadership and school improvement practices in place for group 2;
- Having more computers connected to the internet for group 3.

Table A.3.6: All migrant background (student/family, school) predictors of clustering-derived resilience status – Member State groupings

	MS Group 1 (AT, BE, CY, EL, ES, FR, LU)					MS Group 2 (DE, FI, HR, IT, LT, SI)					MS Group 3 (DK, IE, NL, SE, UK)				
	Est.	SE	Est./SE	P	Sig.	Est.	SE	Est./SE	P	Sig.	Est.	SE	Est./SE	P	Sig.
Student factors															
AGE	0.027	0.078	0.342	0.734		0.071	0.103	0.686	0.496		0.100	0.110	0.910	0.367	
ESCS	-0.557	0.070	-8.010	0.000	*	-0.656	0.085	-7.727	0.000	*	-0.628	0.118	-5.306	0.000	*
EXPECT	0.639	0.106	6.000	0.000	*	0.283	0.118	2.397	0.021	*	0.227	0.105	2.152	0.037	*
GENDER	-0.903	0.162	-5.567	0.000	*	-1.059	0.239	-4.435	0.000	*	-0.536	0.238	-2.249	0.029	*
MINLANG	0.092	0.154	0.598	0.553		-0.145	0.187	-0.777	0.441		0.133	0.168	0.793	0.432	
MOTIVAT	-0.001	0.070	-0.020	0.984		0.078	0.100	0.783	0.437		0.219	0.100	2.192	0.033	*
PEERS	0.049	0.067	0.736	0.465		0.145	0.112	1.297	0.201		-0.097	0.105	-0.923	0.361	
REPEAT	-1.834	0.268	-6.849	0.000	*	-1.481	0.355	-4.176	0.000	*	-2.088	0.459	-4.553	0.000	*
SKIPLATE	-0.247	0.117	-2.107	0.041	*	-0.302	0.143	-2.115	0.040	*	-0.377	0.139	-2.723	0.009	*
School factors															
CLSIZE	0.056	0.067	0.828	0.412		0.362	0.125	2.899	0.006	*	-0.077	0.120	-0.639	0.526	
DATA	0.150	0.123	1.217	0.230		0.052	0.146	0.359	0.721		-0.115	0.130	-0.881	0.383	
GOVFUND	-0.042	0.103	-0.408	0.685		-0.019	0.158	-0.118	0.906		0.119	0.080	1.485	0.144	
IMPROVE	-0.231	0.143	-1.617	0.113		-0.410	0.163	-2.519	0.015	*	-0.061	0.200	-0.307	0.760	
INTSELFN	0.120	0.245	0.490	0.627		0.308	0.341	0.904	0.371		0.478	0.409	1.170	0.248	
LEAD	0.045	0.089	0.507	0.615		-0.278	0.124	-2.251	0.029	*	0.084	0.105	0.800	0.428	
LOCATE	-0.129	0.083	-1.563	0.125		-0.178	0.109	-1.643	0.107		-0.070	0.080	-0.876	0.386	
MONITOR	-0.083	0.114	-0.734	0.467		0.640	0.179	3.576	0.001	*	-0.168	0.183	-0.918	0.364	
PROFDEV	-0.043	0.093	-0.456	0.651		0.133	0.123	1.079	0.286		0.066	0.134	0.495	0.623	
PUBPRIV	0.735	0.227	3.243	0.002	*	1.054	0.548	1.923	0.061		-0.068	0.254	-0.270	0.789	
RATCMP1	0.032	0.066	0.483	0.632		-0.051	0.136	-0.378	0.707		-0.219	0.127	-1.720	0.092	
RATCMP2	0.062	0.092	0.675	0.503		0.078	0.094	0.827	0.413		0.446	0.188	2.369	0.022	*
SCHAUT	-0.317	0.141	-2.251	0.029	*	-0.523	0.209	-2.508	0.016	*	0.171	0.158	1.079	0.286	
SCHESCS	0.719	0.199	3.618	0.001	*	2.102	0.335	6.272	0.000	*	1.528	0.378	4.048	0.000	*
SCHSIZE	0.091	0.104	0.876	0.385		-0.067	0.104	-0.639	0.526		-0.096	0.129	-0.748	0.458	

STUDHLPN	-0.127	0.157	-0.811	0.422		0.118	0.227	0.520	0.605		-0.021	0.290	-0.072	0.943	
STUDRMN	0.338	0.197	1.713	0.094		0.705	0.230	3.066	0.004	*	0.463	0.348	1.331	0.190	
TEACHPART	0.111	0.119	0.930	0.357		-0.087	0.102	-0.858	0.395		-0.126	0.124	-1.016	0.315	
XCURR	0.072	0.123	0.588	0.560		0.074	0.176	0.423	0.674		-0.096	0.126	-0.761	0.450	
Country controls															
BEL	0.403	0.219	1.839	0.072											
ESP	0.842	0.286	2.941	0.005	*										
FIN						0.035	0.609	0.058	0.954						
FRA	0.442	0.314	1.405	0.167											
GBR											1.148	0.390	2.943	0.005	*
GRC	0.145	0.355	0.409	0.685											
HRV						0.657	0.419	1.568	0.124						
IRL											0.788	0.361	2.180	0.034	*
ITA						0.306	0.432	0.708	0.482						
LTU						0.400	0.545	0.734	0.467						
LUX	0.383	0.288	1.330	0.190											
NLD											0.591	0.372	1.589	0.119	
QCY	0.396	0.301	1.316	0.195											
SVN						0.415	0.298	1.393	0.170						
SWE											-0.092	0.335	-0.274	0.785	
(Intercept)	-3.092	0.358	-8.643	0.000	*	-3.164	0.431	-7.333	0.000	*	-4.441	0.808	-5.493	0.000	*
Pseudo r2	0.097					0.137					0.086				

3.3 Discussion

Reflecting on the specific research questions the clustering approach sought to answer, we conclude:

- There is a group of students that can be considered resilient to multiple forms of education-related adversity, additional to ESCS. Additional factors include students with lower than average academic expectations, motivation and peers relative to other high achieving students.
- It is possible to identify groups of resilient students without a priori cut-offs around education-related adversity factors. The clustering analysis is "data-driven" and does not rely on the researcher to define a specific cut-off. This allowed for a substantial group of students to be identified.
- A large number of student and school level factors are associated with this form of resilience compared to the other approaches (classic/deviation). However, it must be noted that several factors in this approach made it more likely to detect significant factors associated with resilience. Firstly, a large sample of students is identified as resilient using this cluster approach compared to the other approaches, which means that any analysis has greater statistical power. Secondly, these students share common attributes (they were clustered together) – they are homogenous and therefore the analysis is more likely, at least in a logical sense, to detect common factors associated with their resilience status.

4. Implementation and analysis of the deviation approach

This section focuses on an approach that seeks to identify academically resilient students, after controlling for numerous education-related adversity factors. The deviation approach is empirically-driven, accommodating for the possibility that students will face different levels of adversity (i.e. not just those in the lowest-quartile) across a range of factors – not just ESCS. We refer to these students as resilient to empirically-derived adversity.

The specific research questions this approach seeks to address are:
- Is it possible to identify students that achieve academically above what would be expected given their exposure to different education-related adversity factors, without the use of cut-offs around a specific variable(s) (e.g. ESCS)?
- What factors are associated with students' resilience to this multiple form adversity? And what additional information does this provide about the study of resilience?

This approach differs from the classic ESCS approach as resilience is defined using all variables included in the model, rather than a selection of significant variables (both theoretically and statistically) and defined cut-offs (e.g. lowest quartile of ESCS and highest quartile of achievement). The key difference to the clustering approach (see section 3) is that the deviation approach is not necessarily concerned with identifying homogenous groups of students.

4.1 Analytical procedure

The steps to operationalise the deviation approach are:

1. Predict students' academic achievement (PISA assessment score) based on multiple adversity factors.

2. Examine the prevalence of students that perform above a statistically meaningful level of predicted achievement across EU Member States (i.e. the shares of students resilient to empirically-derived adversity) and the factors associated with this.

Each step and the results are discussed in turn below.

4.1.1 Step 1: Predict students' academic achievement

In order to identify students that perform above a statistically meaningful level of achievement, it is necessary to first predict a student's academic achievement (PISA assessment score) using a statistical model and compare this to their actual achievement.

To operationalise the approach, a linear regression model focusing on mathematics achievement was constructed. The outcome variable was a student's PISA assessment score (continuous).

Educational adversity factors are the independent (predictor) variables in the linear regression models. As explained in section 1, consideration of factors to include began with a longlist of all those identified as important, in the context of academic resilience, in consultation with the European Commission (see Inception Report; Annex IV). This list was then reviewed and reduced to take account of statistical considerations. Variables with high levels of missing data and those highly correlated or subsumed under composite variables were excluded in the interest of statistical robustness.

To ensure multiple dimensions (e.g. student background characteristics, school management etc.) were accounted for, we employed a forced entry model. This is appropriate as we are testing a theory (i.e. educational adversity presents across multiple factors/dimensions).

Recognising that education-related adversities may vary country to country, and to ensure more accurate predictions, individual models were developed for each Member State retained for advanced statistical analysis. This included testing for interaction effects that were selected based on theoretical and statistical considerations (i.e. the literature review and groups of interest) for each Member State. Only statistically significant interaction effects were retained in the final model for each Member State to avoid unnecessarily complicating the models.

For transparency, the final regression models for each Member State are provided in Table A.4.1. We not discuss each model as we are only interested in the resulting predicted maths assessment scores from which students resilient to empirically-derived adversity can be identified.

Table A.4.1: Linear regression models predicting achievement by Member State

AT					BE				
Factor	**Est.**	**SE**	**Est./SE**	**P**	**Factor**	**Est.**	**SE**	**Est./SE**	**P**
(Intercept)	332.406	64.676	5.140	0.000	(Intercept)	337.809	37.237	9.072	0.000
GENDER	-26.546	2.809	-9.450	0.000	GENDER	-26.172	1.716	-15.249	0.000
REPEAT	-33.245	3.793	-8.764	0.000	REPEAT	-49.746	2.195	-22.667	0.000
AGE	7.589	3.783	2.006	0.051	AGE	6.277	2.258	2.780	0.008
MIGRANTBACKGROUND	-45.159	6.912	-6.534	0.000	MIGRANTBACKGROUND	-12.633	2.966	-4.260	0.000
MINLANG	-42.144	5.756	-7.321	0.000	MINLANG	-19.060	2.621	-7.272	0.000
EXPECT	7.400	0.846	8.746	0.000	EXPECT	14.517	0.648	22.398	0.000
SKIPLATE	-14.550	2.657	-5.476	0.000	SKIPLATE	-15.820	1.502	-10.530	0.000
ESCS	6.808	1.718	3.963	0.000	ESCS	9.362	1.094	8.555	0.000
MOTIVAT	5.932	0.989	5.997	0.000	MOTIVAT	-1.331	0.979	-1.359	0.180
PEERS	5.049	1.213	4.164	0.000	PEERS	-0.928	1.449	-0.641	0.525
SCHSIZE	0.011	0.005	2.100	0.041	SCHSIZE	0.020	0.007	3.019	0.004
RATCMP1	6.998	3.499	2.000	0.051	RATCMP1	-1.150	2.997	-0.384	0.703
RATCMP2	17.985	23.414	0.768	0.446	RATCMP2	21.142	10.195	2.074	0.043
XCURR	4.469	1.260	3.547	0.001	XCURR	4.754	0.973	4.884	0.000
LEAD	-1.237	2.341	-0.528	0.600	LEAD	-1.680	2.059	-0.816	0.418
PUBPRIV	-10.443	6.804	-1.535	0.132	PUBPRIV	-1.585	4.204	-0.377	0.708
SCHAUT	26.731	18.638	1.434	0.158	SCHAUT	4.827	13.248	0.364	0.717
INTSELFN	0.450	6.111	0.074	0.942	INTSELFN	6.328	5.409	1.170	0.248
IMPROVE	-0.941	1.153	-0.816	0.418	IMPROVE	-0.160	1.178	-0.136	0.892
MONITOR	-0.503	2.685	-0.187	0.852	MONITOR	-1.760	1.970	-0.893	0.376
DATA	5.887	2.939	2.003	0.051	DATA	1.764	2.343	0.753	0.455
PROFDEV	-0.137	0.087	-1.571	0.123	PROFDEV	-0.012	0.064	-0.182	0.856
STUDRMN	7.005	5.211	1.344	0.185	STUDRMN	5.992	4.505	1.330	0.190
STUDHLPN	-17.343	5.424	-3.198	0.002	STUDHLPN	-4.561	3.742	-1.219	0.229
GOVFUND	0.054	0.144	0.375	0.709	GOVFUND	0.103	0.083	1.241	0.221
TEACHPART	-2.738	1.459	-1.877	0.067	TEACHPART	-0.427	1.193	-0.358	0.722
LOCATE	0.136	1.751	0.078	0.938	LOCATE	0.701	1.618	0.433	0.667
SCHESCS	64.249	7.024	9.147	0.000	SCHESCS	77.730	9.034	8.604	0.000
MIGRANTBACKGROUND*SKIPLATE	9.495	4.135	2.296	0.026	MIGRANTBACKGROUND*SCHESCS	-28.517	6.684	-4.266	0.000
ESCS*SCHESCS	-5.692	5.070	-1.123	0.267	SCHSIZE*SCHESCS	-0.023	0.010	-2.238	0.030
REPEAT*ESCS	-13.090	4.516	-2.899	0.006	REPEAT*ESCS	-12.506	1.990	-6.285	0.000
MIGRANTBACKGROUND*MINLANG	26.202	7.862	3.333	0.002					
r2	**0.431**				**r2**	**0.536**			

DE						DK				
Factor	**Est.**	**SE**	**Est./SE**	**P**		**Factor**	**Est.**	**SE**	**Est./SE**	**P**
(Intercept)	81.185	57.489	1.412	0.164		(Intercept)	252.988	61.105	4.140	0.000
GENDER	-27.054	1.474	-18.349	0.000		GENDER	-14.370	2.305	-6.235	0.000
REPEAT	-32.858	2.733	-12.025	0.000		REPEAT	-43.310	5.675	-7.632	0.000
AGE	29.812	3.437	8.673	0.000		AGE	13.467	3.374	3.992	0.000
MIGRANTBACKGROUND	-17.164	3.209	-5.349	0.000		MIGRANTBACKGROUND	-35.165	5.173	-6.797	0.000
MINLANG	-44.278	5.654	-7.831	0.000		MINLANG	-35.627	6.636	-5.369	0.000
EXPECT	9.553	0.716	13.345	0.000		EXPECT	8.441	0.660	12.797	0.000
SKIPLATE	-16.527	1.854	-8.912	0.000		SKIPLATE	-12.917	1.699	-7.602	0.000
ESCS	6.837	1.209	5.653	0.000		ESCS	11.923	1.968	6.058	0.000
MOTIVAT	3.845	1.285	2.993	0.004		MOTIVAT	10.210	1.171	8.721	0.000
PEERS	1.498	1.526	0.982	0.331		PEERS	3.881	1.644	2.361	0.022
SCHSIZE	0.007	0.003	2.293	0.026		SCHSIZE	-0.007	0.005	-1.435	0.158
RATCMP1	0.146	4.203	0.035	0.972		RATCMP1	-0.822	2.472	-0.332	0.741
RATCMP2	2.739	10.482	0.261	0.795		RATCMP2	-0.729	34.192	-0.021	0.983
XCURR	1.096	0.929	1.180	0.244		XCURR	1.457	0.843	1.728	0.091
LEAD	-1.394	2.116	-0.659	0.513		LEAD	1.958	1.676	1.168	0.249
PUBPRIV	28.123	8.050	3.493	0.001		PUBPRIV	-1.444	8.853	-0.163	0.871
SCHAUT	-15.646	14.750	-1.061	0.294		SCHAUT	6.014	10.227	0.588	0.559
INTSELFN	4.895	5.713	0.857	0.396		INTSELFN	2.766	3.278	0.844	0.403
IMPROVE	-1.937	1.379	-1.404	0.167		IMPROVE	0.105	0.971	0.108	0.914
MONITOR	2.459	2.440	1.008	0.319		MONITOR	-1.154	1.871	-0.617	0.540
DATA	4.523	2.511	1.802	0.078		DATA	-2.203	2.283	-0.965	0.340
PROFDEV	-0.096	0.056	-1.698	0.096		PROFDEV	0.019	0.045	0.418	0.678
STUDRMN	0.291	4.175	0.070	0.945		STUDRMN	10.148	4.346	2.335	0.024
STUDHLPN	-6.614	4.373	-1.512	0.137		STUDHLPN	-8.492	3.936	-2.158	0.036
GOVFUND	-0.051	0.145	-0.352	0.727		GOVFUND	0.212	0.132	1.611	0.114
TEACHPART	-2.204	1.121	-1.967	0.055		TEACHPART	0.042	0.980	0.043	0.966
LOCATE	-5.895	2.145	-2.749	0.008		LOCATE	0.664	1.332	0.498	0.621
SCHESCS	67.001	3.890	17.225	0.000		SCHESCS	18.350	3.681	4.985	0.000
MIGRANTBACKGROUND*ESCS	-8.691	3.204	-2.713	0.009		MIGRANTBACKGROUND*ESCS	-11.556	2.605	-4.436	0.000
REPEAT*ESCS	-5.700	2.735	-2.084	0.043		EXPECT*ESCS	1.597	0.526	3.035	0.004
MIGRANTBACKGROUND*MINLANG	28.022	7.356	3.810	0.000		MIGRANTBACKGROUND*MINLANG	33.426	8.187	4.083	0.000
PUBPRIV*SCHESCS	-43.661	14.602	-2.990	0.004		SCHSIZE*PUBPRIV	0.036	0.016	2.265	0.028
r2	**0.460**					**r2**	**0.285**			

ES					FI				
Factor	**Est.**	**SE**	**Est./SE**	**P**	**Factor**	**Est.**	**SE**	**Est./SE**	**P**
(Intercept)	470.177	37.402	12.571	0.000	(Intercept)	417.298	150.421	2.774	0.008
GENDER	-24.495	1.120	-21.873	0.000	GENDER	1.239	1.776	0.697	0.489
REPEAT	-60.210	1.435	-41.969	0.000	REPEAT	-78.158	6.462	-12.095	0.000
AGE	2.519	1.863	1.352	0.183	AGE	9.776	3.165	3.089	0.003
MIGRANTBACKGROUND	-13.083	3.063	-4.271	0.000	MIGRANTBACKGROUND	-29.174	9.297	-3.138	0.003
MINLANG	0.930	1.809	0.514	0.610	MINLANG	-21.302	7.085	-3.007	0.004
EXPECT	12.316	0.380	32.439	0.000	EXPECT	8.248	0.651	12.662	0.000
SKIPLATE	-10.944	0.897	-12.201	0.000	SKIPLATE	-13.886	1.734	-8.010	0.000
ESCS	-0.606	1.204	-0.503	0.617	ESCS	22.641	1.784	12.693	0.000
MOTIVAT	7.023	0.602	11.672	0.000	MOTIVAT	12.890	1.211	10.645	0.000
PEERS	1.427	0.832	1.716	0.093	PEERS	0.382	1.805	0.212	0.833
SCHSIZE	-0.004	0.002	-2.304	0.026	SCHSIZE	0.006	0.010	0.565	0.575
RATCMP1	0.571	1.487	0.384	0.703	RATCMP1	3.144	2.458	1.279	0.207
RATCMP2	-0.249	12.912	-0.019	0.985	RATCMP2	5.544	7.237	0.766	0.447
XCURR	0.434	0.443	0.981	0.331	XCURR	-1.397	1.195	-1.169	0.248
LEAD	-3.306	1.001	-3.303	0.002	LEAD	-1.001	2.287	-0.438	0.664
PUBPRIV	-7.223	2.644	-2.731	0.009	PUBPRIV	-7.607	16.642	-0.457	0.650
SCHAUT	-4.969	6.733	-0.738	0.464	SCHAUT	8.506	13.732	0.619	0.538
INTSELFN	2.542	2.874	0.885	0.381	INTSELFN	0.021	4.808	0.004	0.997
IMPROVE	-0.967	0.496	-1.949	0.057	IMPROVE	-0.483	1.040	-0.464	0.644
MONITOR	0.789	0.710	1.111	0.272	MONITOR	-1.940	2.158	-0.899	0.373
DATA	-1.064	1.240	-0.858	0.395	DATA	0.119	2.829	0.042	0.967
PROFDEV	-0.009	0.032	-0.287	0.775	PROFDEV	-0.051	0.045	-1.132	0.263
STUDRMN	-1.045	2.280	-0.459	0.649	STUDRMN	2.673	3.512	0.761	0.450
STUDHLPN	0.343	1.920	0.179	0.859	STUDHLPN	3.691	3.527	1.047	0.300
GOVFUND	-0.014	0.040	-0.364	0.717	GOVFUND	-0.732	1.338	-0.547	0.587
TEACHPART	0.659	0.680	0.968	0.338	TEACHPART	1.781	1.268	1.405	0.166
LOCATE	-0.472	0.945	-0.500	0.620	LOCATE	-2.317	2.680	-0.865	0.391
SCHESCS	14.245	1.579	9.024	0.000	SCHESCS	35.105	9.427	3.724	0.001
MIGRANTBACKGROUND*ESCS	5.727	1.751	3.270	0.002	REPEAT*ESCS	-13.404	6.726	-1.993	0.052
REPEAT*MIGRANTBACKGROUND	12.450	3.435	3.625	0.001	PUBPRIV*SCHESCS	23.888	21.630	1.104	0.275
ESCS*SCHESCS	-1.870	0.835	-2.238	0.030					
EXPECT*ESCS	1.502	0.265	5.671	0.000					
MIGRANTBACKGROUND*MINLANG	-7.057	3.059	-2.307	0.026					
r2	**0.410**				**r2**	**0.264**			

FR					UK				
Factor	**Est.**	**SE**	**Est./SE**	**P**	**Factor**	**Est.**	**SE**	**Est./SE**	**P**
(Intercept)	518.822	60.792	8.534	0.000	(Intercept)	521.752	56.478	9.238	0.000
GENDER	-19.516	1.883	-10.365	0.000	GENDER	-22.631	2.012	-11.248	0.000
REPEAT	-47.225	4.558	-10.362	0.000	REPEAT	-56.527	9.325	-6.062	0.000
AGE	0.176	3.401	0.052	0.959	AGE	-0.492	2.797	-0.176	0.861
MIGRANTBACKGROUND	-24.809	4.639	-5.348	0.000	MIGRANTBACKGROUND	-31.980	13.472	-2.374	0.022
MINLANG	-41.753	6.776	-6.162	0.000	MINLANG	-28.885	8.560	-3.375	0.002
EXPECT	11.735	0.584	20.082	0.000	EXPECT	14.307	0.712	20.108	0.000
SKIPLATE	-19.723	1.941	-10.163	0.000	SKIPLATE	-29.138	2.138	-13.628	0.000
ESCS	14.099	1.680	8.392	0.000	ESCS	12.827	1.315	9.753	0.000
MOTIVAT	3.290	1.093	3.008	0.004	MOTIVAT	6.063	1.018	5.954	0.000
PEERS	2.213	1.653	1.339	0.187	PEERS	-3.081	2.192	-1.406	0.167
SCHSIZE	0.009	0.004	2.059	0.045	SCHSIZE	-0.012	0.007	-1.715	0.093
RATCMP1	-6.689	1.950	-3.430	0.001	RATCMP1	-4.146	3.001	-1.382	0.174
RATCMP2	3.860	13.062	0.295	0.769	RATCMP2	-2.288	21.758	-0.105	0.917
XCURR	1.709	0.704	2.427	0.019	XCURR	-0.363	0.936	-0.388	0.700
LEAD	0.373	1.711	0.218	0.829	LEAD	1.414	1.752	0.807	0.424
PUBPRIV	-2.388	8.407	-0.284	0.778	PUBPRIV	-18.236	9.259	-1.969	0.055
SCHAUT	-10.411	12.320	-0.845	0.402	SCHAUT	0.314	9.426	0.033	0.974
INTSELFN	-2.558	3.997	-0.640	0.525	INTSELFN	15.613	10.396	1.502	0.140
IMPROVE	-1.826	0.812	-2.248	0.029	IMPROVE	-2.685	1.626	-1.651	0.106
MONITOR	3.308	1.924	1.719	0.092	MONITOR	5.028	3.121	1.611	0.114
DATA	-2.759	2.207	-1.250	0.218	DATA	-0.383	3.274	-0.117	0.907
PROFDEV	-0.119	0.068	-1.737	0.089	PROFDEV	0.042	0.055	0.764	0.449
STUDRMN	10.636	5.778	1.841	0.072	STUDRMN	6.879	6.725	1.023	0.312
STUDHLPN	-0.909	3.533	-0.257	0.798	STUDHLPN	-0.763	6.008	-0.127	0.899
GOVFUND	0.071	0.109	0.658	0.514	GOVFUND	0.034	0.092	0.375	0.710
TEACHPART	-0.334	1.375	-0.243	0.809	TEACHPART	-0.959	1.012	-0.947	0.349
LOCATE	-3.577	1.613	-2.217	0.032	LOCATE	-6.144	2.215	-2.773	0.008
SCHESCS	69.241	8.302	8.341	0.000	SCHESCS	39.090	7.552	5.176	0.000
MIGRANTBACKGROUND*ESCS	-14.699	3.585	-4.101	0.000	MIGRANTBACKGROUND*ESCS	-9.137	3.981	-2.295	0.027
MIGRANTBACKGROUND*SCHESCS	20.634	10.080	2.047	0.046	MIGRANTBACKGROUND*SCHESCS	25.072	9.715	2.581	0.013
SCHSIZE*SCHESCS	-0.026	0.007	-3.544	0.001	MIGRANTBACKGROUND*SKIPLATE	12.415	6.575	1.888	0.066
MIGRANTBACKGROUND*MINLANG	39.832	10.048	3.964	0.000	REPEAT*ESCS	-18.716	7.756	-2.413	0.020
SCHSIZE*PUBPRIV	0.014	0.008	1.653	0.105	MIGRANTBACKGROUND*MINLANG	27.606	10.906	2.531	0.015
					PUBPRIV*SCHESCS	22.562	9.870	2.286	0.027
					SCHSIZE*PUBPRIV	0.020	0.008	2.329	0.024
r2	**0.539**				**r2**	**0.315**			

EL					HR				
Factor	Est.	SE	Est./SE	P	Factor	Est.	SE	Est./SE	P
(Intercept)	259.030	69.020	3.753	0.000	(Intercept)	109.313	70.437	1.552	0.127
GENDER	-20.961	2.524	-8.306	0.000	GENDER	-27.291	2.342	-11.653	0.000
REPEAT	-17.673	6.964	-2.538	0.014	REPEAT	-43.745	6.007	-7.282	0.000
AGE	10.160	3.898	2.606	0.012	AGE	20.695	3.737	5.539	0.000
MIGRANTBACKGROUND	25.310	10.488	2.413	0.020	MIGRANTBACKGROUND	-3.488	3.169	-1.101	0.276
MINLANG	-6.878	6.400	-1.075	0.288	MINLANG	-30.535	5.817	-5.249	0.000
EXPECT	23.189	0.977	23.728	0.000	EXPECT	20.726	0.874	23.703	0.000
SKIPLATE	-12.936	1.730	-7.477	0.000	SKIPLATE	-13.836	1.785	-7.750	0.000
ESCS	6.252	1.359	4.600	0.000	ESCS	10.929	1.671	6.541	0.000
MOTIVAT	9.720	1.208	8.045	0.000	MOTIVAT	-0.777	1.036	-0.750	0.457
PEERS	-2.518	1.862	-1.352	0.182	PEERS	5.668	1.761	3.219	0.002
SCHSIZE	-0.021	0.012	-1.700	0.095	SCHSIZE	0.016	0.006	2.449	0.018
RATCMP1	-1.751	6.641	-0.264	0.793	RATCMP1	10.699	9.161	1.168	0.248
RATCMP2	0.658	24.599	0.027	0.979	RATCMP2	-4.675	19.160	-0.244	0.808
XCURR	2.026	1.047	1.936	0.059	XCURR	1.655	1.220	1.357	0.181
LEAD	1.484	2.735	0.543	0.590	LEAD	-3.248	2.746	-1.183	0.242
PUBPRIV	-58.218	19.829	-2.936	0.005	PUBPRIV	-4.820	9.252	-0.521	0.605
SCHAUT	28.266	24.640	1.147	0.257	SCHAUT	18.888	20.814	0.907	0.369
INTSELFN	3.031	5.331	0.569	0.572	INTSELFN	-14.795	15.824	-0.935	0.354
IMPROVE	-0.373	1.016	-0.367	0.715	IMPROVE	-1.640	1.585	-1.034	0.306
MONITOR	1.094	1.821	0.601	0.551	MONITOR	3.582	2.789	1.284	0.205
DATA	4.475	2.935	1.525	0.134	DATA	-3.694	3.112	-1.187	0.241
PROFDEV	0.065	0.068	0.948	0.348	PROFDEV	0.101	0.060	1.676	0.100
STUDRMN	-1.800	4.148	-0.434	0.666	STUDRMN	4.251	3.905	1.089	0.281
STUDHLPN	1.259	4.007	0.314	0.755	STUDHLPN	1.634	6.134	0.266	0.791
GOVFUND	-0.314	0.153	-2.055	0.045	GOVFUND	-0.053	0.153	-0.347	0.730
TEACHPART	-2.640	2.681	-0.985	0.330	TEACHPART	0.285	1.346	0.212	0.833
LOCATE	-1.243	2.370	-0.524	0.602	LOCATE	-6.114	2.682	-2.280	0.027
SCHESCS	42.872	4.645	9.230	0.000	SCHESCS	64.975	6.564	9.898	0.000
MIGRANTBACKGROUND*EXPECT	-8.176	2.411	-3.391	0.001	ESCS*SCHESCS	11.337	3.625	3.127	0.003
r2	0.372				r2	0.415			

IE					IT				
Factor	Est.	SE	Est./SE	P	Factor	Est.	SE	Est./SE	P
(Intercept)	358.013	60.030	5.964	0.000	(Intercept)	371.419	68.846	5.395	0.000
GENDER	-20.828	2.036	-10.229	0.000	GENDER	-33.541	3.140	-10.683	0.000
REPEAT	-36.178	3.685	-9.816	0.000	REPEAT	-45.063	3.806	-11.842	0.000
AGE	7.192	3.709	1.939	0.058	AGE	8.462	3.948	2.143	0.037
MIGRANTBACKGROUND	0.283	4.148	0.068	0.946	MIGRANTBACKGROUND	-19.421	4.638	-4.187	0.000
MINLANG	-9.258	5.369	-1.724	0.091	MINLANG	-8.760	2.867	-3.055	0.004
EXPECT	11.849	0.553	21.418	0.000	EXPECT	12.920	1.266	10.204	0.000
SKIPLATE	-12.218	1.979	-6.172	0.000	SKIPLATE	-15.806	2.126	-7.436	0.000
ESCS	17.982	1.258	14.294	0.000	ESCS	-5.550	3.317	-1.673	0.101
MOTIVAT	8.192	1.005	8.155	0.000	MOTIVAT	1.253	1.419	0.882	0.382
PEERS	-2.364	1.753	-1.349	0.184	PEERS	-0.690	2.111	-0.327	0.745
SCHSIZE	0.011	0.007	1.604	0.115	SCHSIZE	0.006	0.006	0.862	0.393
RATCMP1	-5.277	3.235	-1.631	0.109	RATCMP1	-4.296	6.222	-0.691	0.493
RATCMP2	-20.384	13.070	-1.560	0.125	RATCMP2	-4.620	19.004	-0.243	0.809
XCURR	-0.832	0.610	-1.365	0.179	XCURR	0.626	1.193	0.525	0.602
LEAD	-2.651	1.747	-1.517	0.136	LEAD	-2.948	2.670	-1.104	0.275
PUBPRIV	8.200	3.018	2.718	0.009	PUBPRIV	-12.121	7.607	-1.594	0.117
SCHAUT	13.615	10.419	1.307	0.197	SCHAUT	5.290	19.001	0.278	0.782
INTSELFN	9.246	7.373	1.254	0.216	INTSELFN	-6.912	8.201	-0.843	0.403
IMPROVE	1.274	0.714	1.785	0.080	IMPROVE	1.826	1.432	1.275	0.208
MONITOR	0.094	1.533	0.061	0.951	MONITOR	0.413	3.631	0.114	0.910
DATA	0.323	1.646	0.196	0.845	DATA	-5.571	3.361	-1.658	0.104
PROFDEV	-0.007	0.052	-0.142	0.888	PROFDEV	-0.257	0.107	-2.400	0.020
STUDRMN	-0.264	4.286	-0.062	0.951	STUDRMN	12.665	6.586	1.923	0.060
STUDHLPN	0.313	3.037	0.103	0.918	STUDHLPN	-2.410	6.012	-0.401	0.690
GOVFUND	0.112	0.102	1.092	0.280	GOVFUND	0.079	0.088	0.905	0.370
TEACHPART	-0.818	1.211	-0.676	0.502	TEACHPART	-0.347	1.428	-0.243	0.809
LOCATE	-0.273	0.837	-0.326	0.746	LOCATE	-0.785	2.842	-0.276	0.784
SCHESCS	33.827	4.353	7.771	0.000	SCHESCS	57.676	5.928	9.730	0.000
MIGRANTBACKGROUND*ESCS	6.472	3.460	1.870	0.067	REPEAT*MIGRANTBACKGROUND	26.424	8.773	3.012	0.004
MIGRANTBACKGROUND*SCHESCS	-35.222	8.437	-4.175	0.000	EXPECT*ESCS	1.783	0.776	2.298	0.026
r2	0.308				r2	0.340			

LT					LU				
Factor	**Est.**	**SE**	**Est./SE**	**P**	**Factor**	**Est.**	**SE**	**Est./SE**	**P**
(Intercept)	168.619	69.246	2.435	0.019	(Intercept)	-152.972	63.010	-2.428	0.019
GENDER	-19.579	2.223	-8.809	0.000	GENDER	-17.455	1.767	-9.879	0.000
REPEAT	-52.159	7.573	-6.888	0.000	REPEAT	-41.741	2.339	-17.842	0.000
AGE	17.270	3.895	4.434	0.000	AGE	23.070	3.210	7.186	0.000
MIGRANTBACKGROUND	-68.172	35.592	-1.915	0.061	MIGRANTBACKGROUND	11.346	5.534	2.050	0.046
MINLANG	-27.250	4.509	-6.043	0.000	MINLANG	12.155	4.908	2.477	0.017
EXPECT	19.764	0.964	20.504	0.000	EXPECT	12.687	0.643	19.728	0.000
SKIPLATE	-13.458	1.982	-6.789	0.000	SKIPLATE	-12.149	1.737	-6.993	0.000
ESCS	-9.506	3.251	-2.924	0.005	ESCS	14.740	1.719	8.574	0.000
MOTIVAT	8.087	1.244	6.498	0.000	MOTIVAT	1.332	0.959	1.389	0.171
PEERS	6.293	1.158	5.435	0.000	PEERS	4.523	1.467	3.084	0.003
SCHSIZE	0.001	0.008	0.098	0.923	SCHSIZE	0.001	0.002	0.267	0.791
RATCMP1	-6.489	1.899	-3.417	0.001	RATCMP1	-2.701	1.733	-1.559	0.126
RATCMP2	8.292	13.094	0.633	0.530	RATCMP2	79.331	15.190	5.223	0.000
XCURR	1.344	0.933	1.441	0.156	XCURR	4.090	0.662	6.177	0.000
LEAD	-6.962	2.181	-3.192	0.002	LEAD	-6.421	1.898	-3.383	0.001
PUBPRIV	16.428	18.284	0.899	0.373	PUBPRIV	4.643	4.745	0.979	0.333
SCHAUT	25.201	14.334	1.758	0.085	SCHAUT	39.242	11.912	3.294	0.002
INTSELFN	-22.183	17.124	-1.295	0.201	INTSELFN	-3.625	2.540	-1.427	0.160
IMPROVE	0.778	1.081	0.720	0.475	IMPROVE	1.834	0.656	2.794	0.007
MONITOR	-1.457	2.849	-0.511	0.611	MONITOR	-6.489	1.214	-5.347	0.000
DATA	-0.202	1.820	-0.111	0.912	DATA	0.883	1.070	0.826	0.413
PROFDEV	0.115	0.049	2.351	0.023	PROFDEV	0.177	0.032	5.589	0.000
STUDRMN	4.377	4.132	1.059	0.295	STUDRMN	42.871	10.380	4.130	0.000
STUDHLPN	3.100	3.733	0.831	0.410	STUDHLPN	7.102	4.530	1.568	0.123
GOVFUND	-0.433	0.236	-1.838	0.072	GOVFUND	0.606	0.124	4.881	0.000
TEACHPART	0.034	0.850	0.040	0.968	TEACHPART	1.621	0.874	1.854	0.070
LOCATE	-3.097	1.950	-1.588	0.119	LOCATE	0.667	1.659	0.402	0.689
SCHESCS	40.859	5.105	8.004	0.000	SCHESCS	50.831	2.670	19.035	0.000
MIGRANTBACKGROUND*EXPECT	8.014	4.894	1.638	0.108	MIGRANTBACKGROUND*ESCS	-7.791	2.095	-3.718	0.001
MIGRANTBACKGROUND*SKIPLATE	30.126	12.256	2.458	0.018	REPEAT*ESCS	-7.376	1.636	-4.509	0.000
EXPECT*ESCS	3.528	0.805	4.384	0.000	MIGRANTBACKGROUND*MINLANG	-31.534	6.293	-5.011	0.000
r2	**0.372**				**r2**	**0.479**			

NL					CY				
Factor	**Est.**	**SE**	**Est./SE**	**P**	**Factor**	**Est.**	**SE**	**Est./SE**	**P**
(Intercept)	190.871	71.853	2.656	0.011	(Intercept)	193.179	53.765	3.593	0.001
GENDER	-7.680	2.044	-3.757	0.000	GENDER	-12.825	2.048	-6.261	0.000
REPEAT	-26.585	2.888	-9.206	0.000	REPEAT	-25.662	5.025	-5.107	0.000
AGE	22.631	3.467	6.528	0.000	AGE	10.501	3.240	3.241	0.002
MIGRANTBACKGROUND	-11.644	4.667	-2.495	0.016	MIGRANTBACKGROUND	40.104	9.374	4.278	0.000
MINLANG	-24.085	5.275	-4.566	0.000	MINLANG	-1.420	3.558	-0.399	0.692
EXPECT	8.635	0.956	9.028	0.000	EXPECT	17.640	1.117	15.786	0.000
SKIPLATE	-20.930	2.102	-9.955	0.000	SKIPLATE	-16.600	1.321	-12.566	0.000
ESCS	1.094	1.252	0.874	0.386	ESCS	8.088	1.601	5.053	0.000
MOTIVAT	5.895	1.895	3.111	0.003	MOTIVAT	14.220	1.293	10.999	0.000
PEERS	5.136	1.978	2.597	0.012	PEERS	2.743	1.900	1.444	0.155
SCHSIZE	0.001	0.006	0.088	0.930	SCHSIZE	0.058	0.009	6.738	0.000
RATCMP1	2.921	5.409	0.540	0.592	RATCMP1	-3.555	2.725	-1.304	0.198
RATCMP2	-34.386	41.341	-0.832	0.410	RATCMP2	-1.187	9.166	-0.129	0.898
XCURR	3.074	1.565	1.964	0.055	XCURR	-1.543	0.659	-2.342	0.023
LEAD	-1.722	3.295	-0.523	0.604	LEAD	1.419	1.492	0.951	0.347
PUBPRIV	-17.767	12.238	-1.452	0.153	PUBPRIV	31.478	6.479	4.858	0.000
SCHAUT	12.651	16.859	0.750	0.457	SCHAUT	-18.832	7.767	-2.425	0.019
INTSELFN	2.599	8.856	0.293	0.770	INTSELFN	-18.565	3.931	-4.722	0.000
IMPROVE	0.624	1.845	0.338	0.737	IMPROVE	4.068	1.043	3.900	0.000
MONITOR	-4.508	3.698	-1.219	0.229	MONITOR	-0.390	2.504	-0.156	0.877
DATA	0.466	5.109	0.091	0.928	DATA	-2.923	1.930	-1.514	0.136
PROFDEV	-0.080	0.100	-0.801	0.427	PROFDEV	0.036	0.028	1.270	0.210
STUDRMN	7.262	8.786	0.827	0.412	STUDRMN	3.709	2.244	1.653	0.105
STUDHLPN	5.086	6.266	0.812	0.421	STUDHLPN	-8.754	2.563	-3.415	0.001
GOVFUND	-0.072	0.244	-0.294	0.770	GOVFUND	-0.022	0.074	-0.295	0.769
TEACHPART	-4.217	1.731	-2.436	0.019	TEACHPART	2.884	1.010	2.856	0.006
LOCATE	-6.719	3.740	-1.797	0.079	LOCATE	-1.571	1.224	-1.284	0.205
SCHESCS	125.222	8.555	14.638	0.000	SCHESCS	25.199	3.863	6.523	0.000
MIGRANTBACKGROUND*SCHESCS	-44.273	18.819	-2.353	0.023	MIGRANTBACKGROUND*EXPECT	-9.392	2.164	-4.339	0.000
SCHSIZE*PUBPRIV	0.014	0.008	1.657	0.104	MIGRANTBACKGROUND*SCHESCS	25.370	5.767	4.399	0.000
					ESCS*SCHESCS	9.833	2.797	3.516	0.001
r2	**0.467**				**r2**	**0.325**			

SI						SE				
Factor	Est.	SE	Est./SE	P		Factor	Est.	SE	Est./SE	P
(Intercept)	259.291	58.262	4.450	0.000		(Intercept)	168.784	70.972	2.378	0.021
GENDER	-27.038	2.160	-12.515	0.000		GENDER	-10.552	2.046	-5.158	0.000
REPEAT	-54.032	11.465	-4.713	0.000		REPEAT	-33.417	5.877	-5.686	0.000
AGE	10.303	3.496	2.947	0.005		AGE	16.712	4.067	4.109	0.000
MIGRANTBACKGROUND	-11.270	5.355	-2.105	0.041		MIGRANTBACKGROUND	-39.064	5.695	-6.859	0.000
MINLANG	-22.245	5.311	-4.188	0.000		MINLANG	-27.853	6.822	-4.083	0.000
EXPECT	11.136	0.734	15.180	0.000		EXPECT	12.286	0.699	17.576	0.000
SKIPLATE	-18.010	1.748	-10.301	0.000		SKIPLATE	-22.352	2.277	-9.816	0.000
ESCS	-3.465	1.466	-2.364	0.022		ESCS	7.071	1.914	3.694	0.001
MOTIVAT	6.144	1.287	4.773	0.000		MOTIVAT	6.025	1.016	5.931	0.000
PEERS	5.369	2.004	2.680	0.010		PEERS	8.740	1.531	5.709	0.000
SCHSIZE	0.032	0.004	8.130	0.000		SCHSIZE	-0.007	0.004	-1.719	0.092
RATCMP1	7.845	1.603	4.893	0.000		RATCMP1	0.511	3.611	0.142	0.888
RATCMP2	15.214	15.040	1.012	0.317		RATCMP2	33.832	26.772	1.264	0.212
XCURR	1.088	0.493	2.206	0.032		XCURR	1.033	1.061	0.974	0.335
LEAD	-4.360	1.039	-4.198	0.000		LEAD	-5.557	2.270	-2.448	0.018
PUBPRIV	-82.477	25.440	-3.242	0.002		PUBPRIV	-6.476	3.545	-1.827	0.074
SCHAUT	43.820	6.889	6.361	0.000		SCHAUT	-3.378	17.311	-0.195	0.846
INTSELFN	12.639	4.061	3.113	0.003		INTSELFN	0.923	7.198	0.128	0.898
IMPROVE	1.164	0.657	1.771	0.083		IMPROVE	1.538	1.078	1.426	0.160
MONITOR	4.937	1.156	4.270	0.000		MONITOR	-2.532	1.882	-1.345	0.185
DATA	-6.993	1.217	-5.747	0.000		DATA	-2.869	1.840	-1.559	0.126
PROFDEV	-0.033	0.033	-1.020	0.313		PROFDEV	-0.046	0.045	-1.033	0.307
STUDRMN	-1.745	2.644	-0.660	0.513		STUDRMN	-8.274	7.516	-1.101	0.276
STUDHLPN	6.017	2.048	2.939	0.005		STUDHLPN	10.397	8.210	1.266	0.211
GOVFUND	0.126	0.122	1.033	0.307		GOVFUND	-0.079	0.118	-0.672	0.505
TEACHPART	-0.806	0.615	-1.312	0.196		TEACHPART	0.351	1.380	0.254	0.800
LOCATE	-6.724	1.407	-4.779	0.000		LOCATE	1.750	1.714	1.021	0.312
SCHESCS	78.851	3.628	21.732	0.000		SCHESCS	38.862	6.417	6.056	0.000
MIGRANTBACKGROUND*SCHESCS	1.172	8.532	0.137	0.891		MIGRANTBACKGROUND*SCHESCS	14.896	7.563	1.970	0.055
REPEAT*ESCS	-31.933	10.988	-2.906	0.006		ESCS*SCHESCS	21.995	4.298	5.117	0.000
PUBPRIV*SCHESCS	77.045	27.067	2.846	0.007		MIGRANTBACKGROUND*MINLANG	17.730	9.212	1.925	0.060
SCHSIZE*PUBPRIV	0.090	0.030	2.960	0.005						
r2	0.445					r2	0.333			

4.1.2 Step 2: Students who are deviation-derived resilient

In order to identify students who are resilient to multiple education-related adversity factors, the resulting predicted scores from the above models were assessed against actual scores. Students were identified as resilient where their actual score was 91.88 points (one standard deviation based on aggregate mean actual scores of EU Member States) above their score as predicted via the linear regressions. The group of students identified via this method is considered (academically) resilient to empirically-derived adversity and is discussed below. Recognising that 91.88 points is a large difference in scores, analysis was also conducted on students with actual scores half a standard deviation (45.94 points) above what was predicted for them.

Table A.4.2 shows the shares of resilient students identified as resilient to empirically-derived adversity using the 1 standard deviation criteria. The shares of students are fairly similar to those identified as academically resilient using the classic approach. Interestingly, slightly higher proportions of students with a migrant background were identified as resilient to empirically-derived adversity in comparison to non-migrant background students. This indicates that a) second-generation students and first-generation migrants are more likely to feature as resilient using this approach as migration status is included as a predicting factor, and b) their exposure to other factors (e.g. ESCS) may be amplified.

Table A.4.2: Shares of students resilient to empirically-derived adversity (1 SD)

	Freq	Weighted %	SE
Non-migrant background	11,979	8.66	0.18
Second-generation	1,034	10.77	0.57
First-generation	959	9.96	0.67

Table A.4.3 details the shares of resilient students identified as resilient to empirically-derived adversity using the half a standard deviation criteria. Approximately, one in four students are identified as resilient using half a standard deviation criteria.

Table A.4.3: Shares of students resilient to empirically-derived adversity (half SD)

	Freq	Weighted %	SE
Non-migrant background	34,427	25.35	0.35
Second-generation	2,710	28.07	0.91
First-generation	2,592	24.7	0.78

Table A.4.4 and Figure A.4.1 detail the shares of resilient students by Member State and student background using the 1 standard deviation criteria. Shares of students ranged considerably between Member States and student background. Particular caution is advised when making comparisons between and within Member States for second-generation and first-generation students. This is due to the smaller sample sizes on which statistics are based and, accordingly, sometimes large standard errors. The key points are:
- The shares of non-migrant background students were fairly similar across member states ranging from 7.3% in Belgium to 11% in the United Kingdom.
- The shares of second-generation students ranged from 6.6% in Slovenia to 14.7% in Finland. Belgium, Germany, Denmark, Spain, Finland, France, Ireland, Netherlands and Sweden had higher shares (after accounting for standard errors)

of resilient second-generation students compared to students with a non-migrant background.

- Regarding first-generation students, Slovenia had the lowest share (7.4%) and Lithuania the highest (20.5%). Due to smaller sample sizes, differences between first-generation students to other groups within each Member State are, typically not significant. Cyprus was an exception to this with higher shares of first-generation students compared to non-migrant background and second-generation students.

Table A.4.4: Shares of students resilient to empirically-derived adversity (1 SD), by Member State

	Non-migrant background			Second-generation			First-generation		
	Freq	**Weighted %**	**SE**	**Freq**	**Weighted %**	**SE**	**Freq**	**Weighted %**	**SE**
AT	550	9.53	0.6	77	9.33	0.99	36	8.16	1.44
BE	571	7.37	0.37	76	9.74	1.37	66	9.41	1.2
CY	519	10.83	0.42	15	8.24	2.02	64	13.34	1.46
DE	355	7.47	0.5	70	9.37	1.13	15	8.01	2.88
DK	420	7.79	0.47	111	10.65	1.56	42	12.24	2.44
EL	495	9.96	0.63	40	10.41	1.84	13	8.05	2.41
ES	2827	7.54	0.24	72	11.78	1.75	292	8.32	0.74
FI	523	9.43	0.51	16	14.67	3.45	20	17.13	3.87
FR	389	7.42	0.51	49	9.71	1.36	27	10.95	2.37
HR	447	8.83	0.45	50	9.53	1.24	10	10.8	3.32
IE	363	7.71	0.45	21	11.68	2.62	51	9.04	1.12
IT	1465	10.79	0.6	51	13.63	2.58	56	12.21	2.31
LT	563	9.6	0.51	22	13.43	2.89	3	20.46	12.66
LU	214	8.69	0.61	142	9.04	0.63	92	8.54	0.96
NL	380	7.9	0.6	52	11.56	2.31	13	10.79	3.18
SE	401	9.33	0.48	64	13.23	2.09	35	9.55	1.39
SI	425	7.4	0.47	18	6.56	1.85	16	7.44	2.33
UK	1072	11.27	0.63	88	13.34	2.24	108	11.82	1.76

Figure A.4.1: Shares of students resilient to empirically-derived adversity (1 SD), by Member State
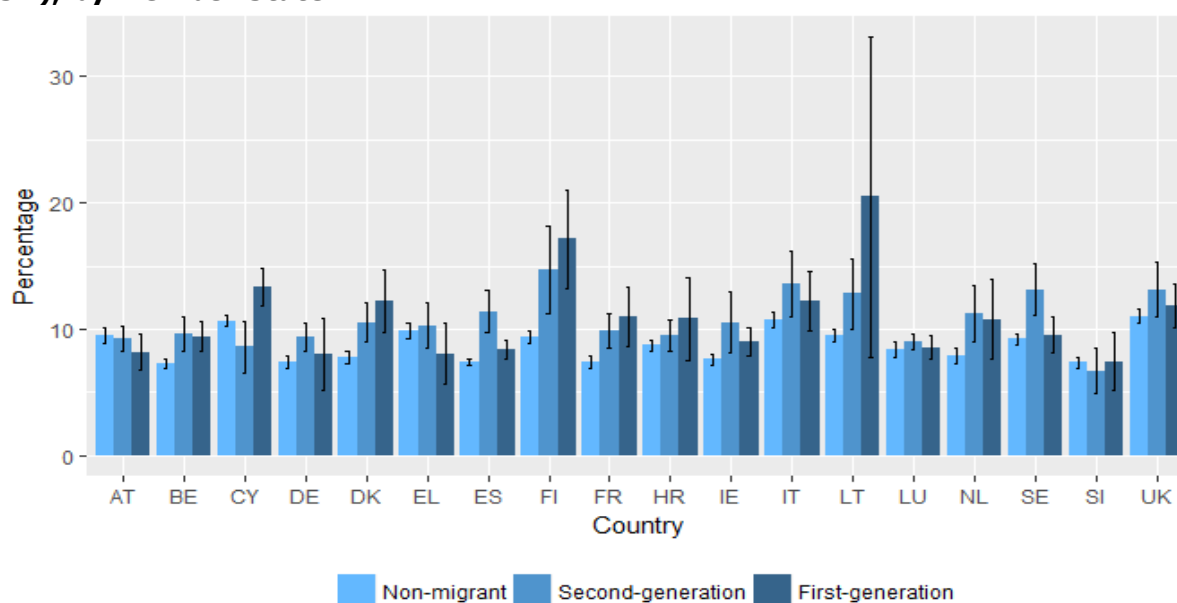
Table A.4.5 and Figure A.4.2 detail the shares of resilient students by Member State and student background using the half a standard deviation criteria. Shares of students ranged considerably between Member States and student background. Particular caution is advised when making comparisons between and within Member States for second-generation and first-generation students. This is due to the smaller sample sizes on which statistics are based and, accordingly, sometimes large standard errors. The key points are:

- Generally, the shares of resilient students across all student groups and Member States are fairly consistent.
- The shares of non-migrant background students ranged from 23.8% in Germany to 27.6% in Italy.
- The shares of second-generation students ranged from 22.3% in Cyprus to 32.5% in Italy. Belgium, Spain, France, Croatia and the UK had higher shares (after accounting for standard errors) of second-generation students compared to non-migrant background students.
- Germany had the lowest share (20.2%) of resilient first-generation students and Lithuania the highest (35.5%) although the latter is based on a small sample and as such we cannot say this is significant. Cyprus and Ireland had higher shares of resilient first-generation students compared to non-migrant background students.

Table A.4.5: Shares of students resilient using the deviation approach (half SD), by Member State

	Non-migrant background			Second-generation			First-generation		
	Freq	**Weighted %**	**SE**	**Freq**	**Weighted %**	**SE**	**Freq**	**Weighted %**	**SE**
AT	1518	26.5	1	226	28.33	1.8	114	26.26	3.1
BE	1856	24.12	0.68	214	28.21	2.22	176	22.64	1.63
CY	1278	27.18	0.68	39	22.27	2.93	153	30.99	1.98
DE	1115	23.87	0.8	188	25.56	2.02	40	20.15	3.57
DK	1281	24.54	0.92	299	27.68	2.19	86	26.8	3.81
EL	1301	26.39	1.05	95	25.24	2.74	41	24.69	3.57
ES	8807	24.46	0.48	198	28.94	2.66	868	24.71	1.14
FI	1425	25.58	0.84	29	26.96	4.77	36	30.25	4.04
FR	1259	24.16	0.92	137	27.34	2.37	65	25.99	2.82
HR	1273	24.9	0.76	142	27.83	1.67	22	22.5	4.43
IE	1182	25.17	0.87	44	24.03	4.02	158	27.58	1.65
IT	3398	27.57	0.98	121	32.46	3.84	132	25.46	2.84
LT	1442	24.13	0.73	51	27.82	3.82	10	35.5	11.37
LU	624	25.37	0.79	387	24.85	1.05	263	24.36	1.34
NL	1163	24.49	1.11	119	26.54	3	29	25.39	4.89
SE	1154	26.74	0.95	147	30.22	2.54	88	24.71	2.4
SI	1386	24.74	0.69	66	26	3.06	47	24.19	3.88
UK	2965	27.9	0.95	208	32.71	2.32	264	25.16	2.01

Figure A.4.2: Shares of students resilient to empirically-derived adversity (half SD), by Member State
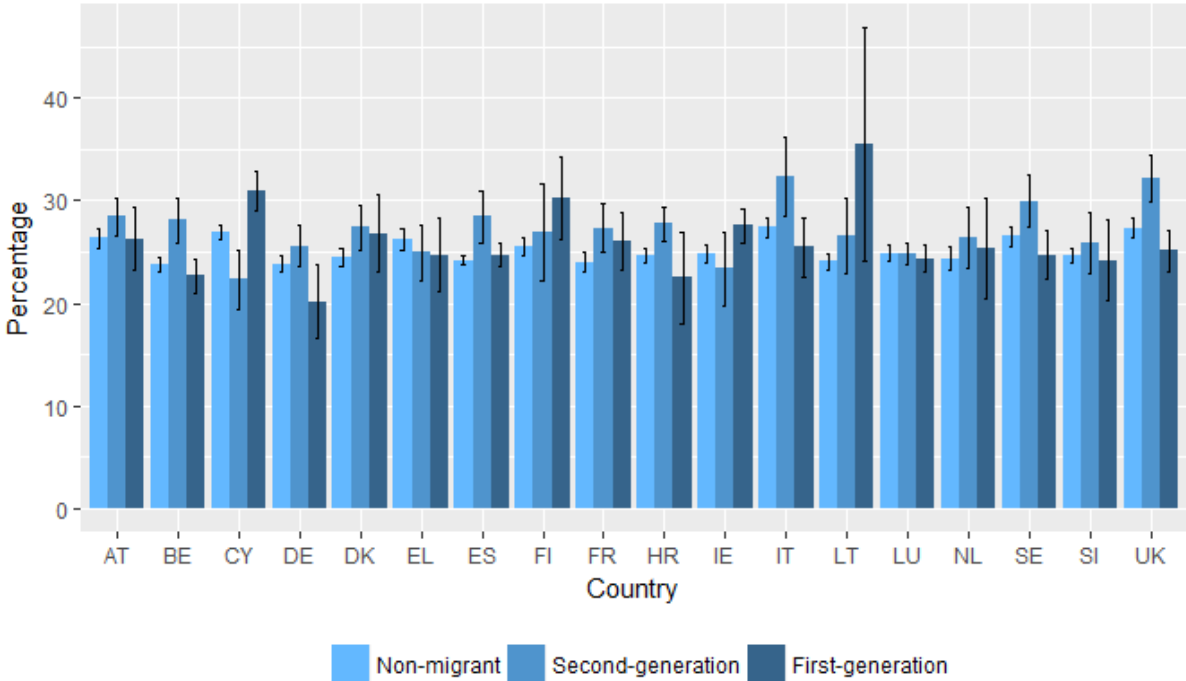
4.2 Factors associated with deviation-derived adversity

Logistic regressions were undertaken to understand what student and school level factors are associated with students' resilience to deviation-derived adversity. The outcome variable is resilient to empirically-derived adversity (binary Y/N), identified via the models predicting student achievement. To aid interpretation, all non-binary variables included in the model were standardised (mean = 0 and standard deviation = 1). Country was included in the model as a control variable. All models include PISA student and replicate weights, as per OECD guidance.

Table A.4.6 presents the regression results for deviation-derived adversity using the 1 standard deviation criteria for all migrant background students and then individually for second-generation and first-generation students. The only statistically significant student level factors associated with resilience to deviation-derived adversity is speaking a minority language (i.e. the student speaks a different language at home to the one they were assessed in).

At the school level, statistically significant factors included attending a school with larger class sizes, a greater proportion of computers connected to the internet and less school improvement practice in place. The latter two were only significant for second-generation students. No school level factors were found to be statistically significant for first-generation students.

Table A.4.6: All migrant background (student/family, school) predictors of deviation-derived resilience status (1 SD criteria)

	All migrant background students					Second-generation students					First-generation students				
	Est.	SE	Est/SE	p	Sig.	Est.	SE	Est/SE	p	Sig.	Est.	SE	Est/SE	p	Sig.
Student factors															
AGE	-0.009	0.039	-0.222	0.825		0.008	0.052	0.155	0.878		-0.016	0.065	-0.245	0.808	
ESCS	0.02	0.045	0.438	0.664		-0.038	0.061	-0.62	0.54		0.099	0.065	1.531	0.135	
EXPECT	-0.034	0.046	-0.739	0.465		-0.08	0.074	-1.077	0.289		0.011	0.061	0.176	0.862	
GENDER	-0.044	0.097	-0.456	0.652		0.092	0.121	0.766	0.449		-0.227	0.148	-1.531	0.135	
MINLANG	0.172	0.079	2.178	0.036	*	0.087	0.121	0.724	0.474		0.338	0.13	2.594	0.014	*
MOTIVAT	-0.018	0.04	-0.453	0.653		-0.013	0.053	-0.254	0.801		-0.019	0.064	-0.294	0.77	
PEERS	-0.044	0.042	-1.051	0.301		-0.054	0.057	-0.955	0.346		-0.041	0.051	-0.8	0.429	
REPEAT	0.136	0.103	1.322	0.195		0.081	0.151	0.535	0.596		0.241	0.149	1.62	0.114	
SKIPLATE	0.051	0.034	1.511	0.14		0.001	0.056	0.026	0.98		0.1	0.052	1.929	0.062	
School factors															
CLSIZE	0.16	0.053	3	0.005	*	0.13	0.069	1.89	0.067		0.147	0.08	1.838	0.075	
DATA	-0.08	0.07	-1.146	0.26		-0.08	0.094	-0.846	0.404		-0.087	0.091	-0.955	0.346	
GOVFUND	-0.016	0.057	-0.283	0.779		-0.053	0.077	-0.681	0.5		0.035	0.065	0.537	0.595	
IMPROVE	-0.099	0.08	-1.232	0.226		-0.196	0.098	-2.003	0.053		0.017	0.092	0.181	0.857	
INTSELFN	0.177	0.178	0.995	0.327		0.186	0.208	0.894	0.378		0.119	0.215	0.551	0.585	
LEAD	0.054	0.061	0.888	0.381		0.097	0.075	1.29	0.206		0.013	0.075	0.169	0.867	
LOCATE	0.017	0.05	0.341	0.735		0.062	0.056	1.111	0.274		-0.052	0.066	-0.796	0.432	
MONITOR	-0.006	0.075	-0.082	0.935		0.069	0.1	0.685	0.498		-0.075	0.085	-0.888	0.381	
PROFDEV	0.096	0.061	1.578	0.124		0.1	0.064	1.552	0.13		0.098	0.096	1.02	0.315	
PUBPRIV	0.249	0.153	1.622	0.114		0.316	0.187	1.687	0.101		0.176	0.176	1	0.324	
RATCMP1	0.043	0.051	0.832	0.411		0.053	0.065	0.82	0.418		0.064	0.068	0.942	0.353	
RATCMP2	0.069	0.065	1.052	0.3		0.212	0.088	2.418	0.021	*	-0.046	0.074	-0.619	0.54	
SCHAUT	0.016	0.084	0.187	0.853		-0.004	0.098	-0.044	0.966		0.033	0.131	0.248	0.805	
SCHESCS	-0.142	0.173	-0.823	0.416		0.007	0.212	0.035	0.973		-0.306	0.186	-1.648	0.109	
SCHSIZE	-0.002	0.051	-0.043	0.966		-0.082	0.068	-1.205	0.236		0.113	0.057	1.959	0.058	
STUDHLPN	-0.008	0.13	-0.063	0.95		0.143	0.149	0.965	0.341		-0.202	0.203	-0.995	0.327	
STUDRMN	0.107	0.116	0.924	0.362		0.022	0.154	0.144	0.887		0.191	0.169	1.132	0.265	
TEACHPART	-0.05	0.063	-0.795	0.432		-0.016	0.076	-0.212	0.833		-0.104	0.078	-1.34	0.189	
XCURR	-0.007	0.066	-0.099	0.922		0.006	0.083	0.069	0.946		-0.012	0.091	-0.137	0.892	
Country controls															
BEL	0.128	0.165	0.778	0.442		0.106	0.21	0.506	0.616		0.215	0.3	0.716	0.479	
DEU	0.099	0.213	0.465	0.645		0.1	0.212	0.471	0.641		0.023	0.46	0.05	0.961	

DNK	0.453	0.27	1.676	0.103		0.274	0.275	0.994	0.327		0.771	0.428	1.803	0.08	
ESP	-0.071	0.21	-0.337	0.738		0.398	0.294	1.355	0.184		-0.218	0.315	-0.691	0.494	
FIN	0.964	0.342	2.817	0.008	*	1.065	0.476	2.236	0.032	*	0.857	0.505	1.698	0.099	
FRA	0.15	0.23	0.651	0.519		0.064	0.235	0.272	0.788		0.364	0.383	0.951	0.348	
GBR	0.422	0.259	1.631	0.112		0.441	0.303	1.453	0.155		0.523	0.331	1.581	0.123	
GRC	0.335	0.291	1.152	0.258		0.457	0.348	1.313	0.198		0.146	0.52	0.281	0.781	
HRV	0.388	0.249	1.558	0.129		0.396	0.278	1.426	0.163		0.645	0.453	1.423	0.164	
IRL	0.176	0.232	0.755	0.455		0.457	0.322	1.417	0.165		0.193	0.325	0.592	0.558	
ITA	0.447	0.243	1.843	0.074		0.557	0.321	1.736	0.092		0.525	0.383	1.37	0.18	
LTU	0.711	0.379	1.876	0.069		0.512	0.39	1.312	0.198		1.034	0.755	1.37	0.18	
LUX	0.109	0.215	0.509	0.614		0.209	0.244	0.857	0.398		-0.063	0.341	-0.184	0.855	
NLD	0.286	0.287	0.995	0.327		0.265	0.28	0.946	0.351		0.341	0.44	0.776	0.443	
QCY	0.537	0.223	2.406	0.022	*	0.096	0.382	0.25	0.804		0.833	0.342	2.435	0.02	*
SVN	-0.227	0.278	-0.817	0.42		-0.313	0.334	-0.938	0.355		-0.079	0.468	-0.168	0.867	
SWE	0.382	0.238	1.605	0.118		0.414	0.271	1.528	0.136		0.373	0.408	0.916	0.366	
(Intercept)	-2.833	0.221	-12.814	0	*	-2.935	0.267	-10.991	0	*	-2.851	0.335	-8.512	0	*
Pseudo r2	0.010					0.015					0.018				

Table A.4.7 details the same analysis as above but using the half a standard deviation criteria to define resilient students.

At the student level, lower levels of motivation was statistically significant for all migrant background students but with a relatively small effect size. Speaking a minority language has a positive association with resilience for second-generation students. Being a male was associated with resilience for first-generation students.

Significant school factors included larger class sizes, attending a privately operated school (second-generation students model only), and larger school size and less improvement practices in place (first-generation students only).

Table A.4.7: All migrant background (student/family, school) predictors of deviation-derived resilience status (half SD criteria)

	All migrants					Second-generation					First-generation				
	Est.	SE	Est/SE	p	Sig.	Est.	SE	Est/SE	p	Sig.	Est.	SE	Est/SE	p	Sig.
Student factors															
AGE	-0.037	0.027	-1.367	0.181		-0.045	0.040	-1.129	0.267		-0.019	0.041	-0.473	0.640	
ESCS	-0.015	0.036	-0.423	0.675		-0.051	0.046	-1.119	0.271		0.043	0.044	0.983	0.333	
EXPECT	0.030	0.034	0.891	0.379		0.018	0.051	0.359	0.722		0.044	0.044	1.009	0.320	
GENDER	-0.117	0.065	-1.783	0.083		-0.083	0.084	-0.989	0.330		-0.187	0.091	-2.063	0.047	*
MINLANG	0.083	0.056	1.489	0.146		0.179	0.079	2.268	0.030	*	0.067	0.073	0.923	0.362	
MOTIVAT	-0.062	0.027	-2.322	0.026	*	-0.062	0.038	-1.614	0.116		-0.068	0.042	-1.629	0.112	
PEERS	0.023	0.028	0.824	0.416		0.000	0.037	-0.011	0.992		0.035	0.041	0.850	0.401	
REPEAT	-0.016	0.078	-0.211	0.834		-0.057	0.106	-0.539	0.593		0.017	0.104	0.165	0.870	
SKIPLATE	0.015	0.026	0.582	0.564		-0.018	0.039	-0.473	0.639		0.057	0.037	1.539	0.133	
School factors															
CLSIZE	0.128	0.036	3.526	0.001	*	0.129	0.050	2.579	0.014	*	0.124	0.049	2.558	0.015	*
DATA	-0.059	0.048	-1.217	0.232		-0.056	0.066	-0.857	0.398		-0.075	0.067	-1.116	0.272	
GOVFUND	0.003	0.033	0.077	0.939		-0.005	0.058	-0.082	0.935		0.003	0.043	0.071	0.944	
IMPROVE	-0.097	0.054	-1.821	0.077		-0.068	0.069	-0.988	0.330		-0.139	0.067	-2.093	0.044	*
INTSELFN	0.173	0.122	1.419	0.165		0.205	0.153	1.343	0.188		0.106	0.150	0.705	0.485	
LEAD	-0.012	0.036	-0.339	0.736		0.000	0.050	0.002	0.999		-0.021	0.047	-0.454	0.652	
LOCATE	0.020	0.034	0.578	0.567		0.040	0.041	0.974	0.337		-0.028	0.047	-0.603	0.550	
MONITOR	0.070	0.058	1.217	0.232		0.090	0.086	1.044	0.304		0.066	0.064	1.033	0.309	
PROFDEV	0.041	0.048	0.850	0.401		0.041	0.060	0.683	0.499		0.051	0.049	1.048	0.302	
PUBPRIV	0.185	0.110	1.693	0.100		0.412	0.134	3.067	0.004	*	-0.073	0.136	-0.540	0.593	
RATCMP1	0.033	0.038	0.885	0.382		0.028	0.051	0.553	0.584		0.055	0.049	1.114	0.273	
RATCMP2	-0.018	0.038	-0.461	0.648		-0.028	0.058	-0.476	0.637		-0.010	0.055	-0.183	0.856	
SCHAUT	0.077	0.056	1.374	0.178		0.037	0.068	0.553	0.584		0.114	0.081	1.408	0.168	
SCHESCS	0.012	0.098	0.124	0.902		-0.046	0.128	-0.361	0.720		0.026	0.109	0.240	0.811	
SCHSIZE	0.005	0.032	0.157	0.876		-0.060	0.047	-1.291	0.206		0.093	0.042	2.186	0.036	*
STUDHLPN	0.161	0.081	1.977	0.056		0.204	0.106	1.926	0.062		0.107	0.112	0.957	0.345	
STUDRMN	-0.032	0.083	-0.389	0.699		-0.082	0.101	-0.812	0.423		0.008	0.110	0.071	0.944	
TEACHPART	-0.039	0.041	-0.956	0.346		-0.035	0.054	-0.647	0.522		-0.043	0.054	-0.790	0.435	
XCURR	-0.045	0.058	-0.767	0.448		-0.044	0.079	-0.564	0.576		-0.029	0.061	-0.465	0.645	
Country controls															
BEL	-0.123	0.130	-0.953	0.347		-0.007	0.158	-0.045	0.964		-0.198	0.210	-0.940	0.354	
DEU	-0.119	0.147	-0.805	0.426		0.015	0.152	0.101	0.920		-0.386	0.294	-1.316	0.197	

DNK	-0.016	0.191	-0.084	0.934		0.060	0.221	0.270	0.789		-0.043	0.275	-0.158	0.875	
ESP	-0.019	0.155	-0.124	0.902		0.134	0.208	0.645	0.523		-0.028	0.234	-0.121	0.905	
FIN	0.042	0.199	0.208	0.836		-0.044	0.329	-0.133	0.895		0.103	0.296	0.347	0.731	
FRA	-0.031	0.161	-0.195	0.847		0.031	0.178	0.175	0.862		-0.036	0.257	-0.140	0.890	
GBR	-0.015	0.153	-0.100	0.921		0.238	0.200	1.191	0.242		-0.146	0.246	-0.592	0.558	
GRC	0.127	0.199	0.640	0.527		0.096	0.209	0.461	0.647		0.261	0.336	0.776	0.443	
HRV	0.154	0.175	0.880	0.385		0.234	0.199	1.178	0.247		-0.032	0.353	-0.091	0.928	
IRL	-0.016	0.159	-0.098	0.923		-0.123	0.264	-0.466	0.644		0.116	0.239	0.486	0.630	
ITA	0.125	0.163	0.771	0.446		0.439	0.218	2.011	0.052		-0.070	0.295	-0.236	0.815	
LTU	-0.007	0.246	-0.028	0.978		0.031	0.253	0.122	0.903		0.190	0.480	0.397	0.694	
LUX	-0.114	0.149	-0.762	0.451		0.031	0.185	0.167	0.869		-0.332	0.235	-1.415	0.166	
NLD	-0.227	0.209	-1.088	0.284		-0.194	0.206	-0.939	0.354		-0.218	0.350	-0.622	0.538	
QCY	0.195	0.159	1.226	0.229		-0.124	0.244	-0.508	0.615		0.409	0.248	1.649	0.108	
SVN	-0.084	0.193	-0.433	0.667		-0.020	0.210	-0.097	0.924		-0.109	0.325	-0.335	0.740	
SWE	-0.079	0.175	-0.450	0.655		0.016	0.212	0.074	0.942		-0.132	0.294	-0.449	0.656	
(Intercept)	-1.239	0.167	-7.431	0.000	*	-1.410	0.192	-7.350	0.000	*	-1.085	0.258	-4.205	0.000	*
Pseudo r2	0.01					0.019					0.014				

In order to understand if the factors associated with students' deviation-derived resilience differ between Member states and to account for national policy/education systems, regression analysis was rerun by the Member State groupings (see section 1). Results are for all migrant background students only due to low sample sizes for first-generation and second-generation students.

Table A.4.8 details the regression results for all migrant background students by Member State grouping for students identified as resilient using the 1 standard deviation criteria. At the student level, the only statistically significant factor associated with resilience to empirically-derived adversity was having lower levels of motivation in Group 1.

At the school level, attending a school with larger class sizes, a greater proportion of teachers taking part in professional development and an overall smaller school were statistically significant for Group 2. For Group 3, having less teacher involvement in decision making and attending a larger school were associated with resilience status.

Table A.4.8: All migrant background (student/family, school) predictors of deviation-derived resilience status (1 SD criteria), by Member State grouping

	MS Group 1 (AT, BE, CY, EL, ES, FR, LU)					MS Group 2 (DE, FI, HR, IT, LT, SI)					MS Group 3 (DK, IE, NL, SE, UK)				
	Est.	SE	Est/SE	p	Sig.	Est.	SE	Est/SE	p	Sig.	Est.	SE	Est/SE	p	Sig.
Student factors															
AGE	0.009	0.061	0.149	0.882		-0.031	0.092	-0.341	0.735		0.008	0.073	0.115	0.909	
ESCS	0.125	0.065	1.929	0.060		0.043	0.081	0.527	0.601		-0.083	0.071	-1.168	0.249	
EXPECT	-0.041	0.072	-0.576	0.567		-0.028	0.129	-0.218	0.828		-0.053	0.077	-0.692	0.492	
GENDER	-0.160	0.155	-1.033	0.307		-0.069	0.150	-0.462	0.647		0.142	0.150	0.950	0.347	
MINLANG	0.170	0.138	1.229	0.225		0.127	0.153	0.825	0.414		0.236	0.139	1.697	0.096	
MOTIVAT	-0.129	0.059	-2.185	0.034	*	0.003	0.098	0.031	0.976		0.126	0.071	1.772	0.083	
PEERS	-0.065	0.058	-1.120	0.268		0.061	0.069	0.875	0.386		-0.113	0.099	-1.146	0.258	
REPEAT	0.190	0.154	1.236	0.223		0.107	0.182	0.586	0.561		0.182	0.225	0.806	0.424	
SKIPLATE	-0.014	0.063	-0.222	0.825		0.077	0.071	1.088	0.282		0.080	0.077	1.038	0.305	
School factors															
CLSIZE	0.081	0.061	1.317	0.194		0.428	0.123	3.481	0.001	*	0.048	0.101	0.475	0.637	
DATA	-0.067	0.087	-0.769	0.446		-0.193	0.124	-1.557	0.126		-0.119	0.125	-0.952	0.346	
GOVFUND	-0.039	0.093	-0.422	0.675		-0.096	0.116	-0.829	0.412		0.091	0.067	1.348	0.184	
IMPROVE	-0.005	0.093	-0.055	0.956		-0.295	0.151	-1.954	0.057		0.069	0.168	0.411	0.683	
INTSELFN	-0.183	0.202	-0.904	0.371		0.464	0.410	1.132	0.263		0.718	0.379	1.892	0.065	
LEAD	0.037	0.067	0.555	0.582		0.073	0.128	0.574	0.569		0.087	0.097	0.895	0.375	
LOCATE	0.008	0.060	0.127	0.899		0.056	0.106	0.529	0.599		-0.037	0.072	-0.505	0.616	
MONITOR	0.013	0.098	0.129	0.898		0.116	0.138	0.843	0.404		-0.179	0.155	-1.153	0.255	
PROFDEV	0.040	0.072	0.560	0.578		0.340	0.104	3.277	0.002	*	-0.035	0.101	-0.341	0.734	
PUBPRIV	0.368	0.219	1.685	0.099		0.570	0.429	1.327	0.191		0.030	0.200	0.151	0.881	
RATCMP1	0.006	0.062	0.094	0.926		0.170	0.121	1.408	0.166		0.044	0.087	0.501	0.618	
RATCMP2	0.037	0.095	0.391	0.697		0.117	0.115	1.012	0.317		0.081	0.154	0.526	0.602	
SCHAUT	0.022	0.120	0.180	0.858		-0.408	0.258	-1.580	0.121		0.203	0.122	1.658	0.104	
SCHESCS	-0.212	0.185	-1.148	0.257		-0.152	0.286	-0.533	0.597		-0.051	0.291	-0.174	0.863	
SCHSIZE	-0.004	0.085	-0.052	0.958		-0.219	0.105	-2.087	0.042	*	0.237	0.087	2.727	0.009	*
STUDHLPN	0.076	0.157	0.485	0.630		-0.182	0.262	-0.693	0.491		0.178	0.313	0.569	0.572	
STUDRMN	0.161	0.184	0.877	0.385		0.125	0.220	0.567	0.573		-0.260	0.416	-0.625	0.535	
TEACHPART	0.044	0.089	0.494	0.624		0.058	0.116	0.502	0.618		-0.181	0.083	-2.177	0.035	*
XCURR	-0.021	0.091	-0.230	0.819		0.194	0.152	1.279	0.207		-0.132	0.110	-1.199	0.237	
Country controls															
BEL	-0.041	0.194	-0.213	0.832											
ESP	-0.122	0.214	-0.570	0.571											

FIN						1.310	0.443	2.960	0.005	*					
FRA	0.133	0.236	0.563	0.576											
GBR											0.118	0.303	0.391	0.698	
GRC	0.364	0.314	1.159	0.253											
HRV						0.210	0.354	0.593	0.556						
IRL											-0.058	0.318	-0.183	0.856	
ITA						0.252	0.310	0.813	0.420						
LTU						0.729	0.526	1.385	0.173						
LUX	-0.098	0.267	-0.368	0.714											
NLD											-0.056	0.299	-0.187	0.853	
QCY	0.563	0.260	2.168	0.035	*										
SVN						-0.340	0.306	-1.110	0.273						
SWE											0.037	0.246	0.150	0.881	
(Intercept)	-2.472	0.287	-8.610	0.000	*	-3.081	0.444	-6.941	0.000	*	-3.144	0.613	-5.129	0.000	*
Pseudo r2	0.015					0.036					0.024				

Employing the half a standard deviation criteria to define resilience status, Table A.4.9 details the regression results across country groups for all migrant background students. At the student level, the only statistically significant factors identified were for Group 1 and included lower levels of motivation and being male.

At the school level, attending a privately operated school and a school where staff provide help with homework were significant for Group 1. Attending a private school and a school with larger class sizes were significant for Group 2. Regarding Group 3, less teacher participation and use of data in decision making, and greater levels of school autonomy and use of internal/self-evaluation were associated with resilience status.

Table A.4.9: All migrant background (student/family, school) predictors of deviation-derived resilience status (half SD criteria), by Member State grouping

	MS Group 1 (AT, BE, CY, EL, ES, FR, LU)					MS Group 2 (DE, FI, HR, IT, LT, SI)					MS Group 3 (DK, IE, NL, SE, UK)				
	Est.	SE	Est/SE	p	Sig.	Est.	SE	Est/SE	p	Sig.	Est.	SE	Est/SE	p	Sig.
Student factors															
AGE	-0.054	0.041	-1.321	0.193		-0.041	0.066	-0.619	0.539		-0.014	0.052	-0.274	0.786	
ESCS	0.015	0.045	0.341	0.735		0.020	0.071	0.280	0.781		-0.071	0.058	-1.211	0.232	
EXPECT	0.022	0.044	0.499	0.620		0.096	0.085	1.132	0.263		-0.018	0.055	-0.328	0.745	
GENDER	-0.187	0.090	-2.088	0.043	*	0.012	0.129	0.095	0.925		-0.129	0.128	-1.007	0.319	
MINLANG	0.090	0.090	0.996	0.325		0.168	0.115	1.456	0.152		0.063	0.115	0.547	0.587	
MOTIVAT	-0.102	0.039	-2.603	0.012	*	-0.122	0.073	-1.679	0.100		0.081	0.056	1.449	0.154	
PEERS	0.056	0.041	1.342	0.186		-0.013	0.052	-0.257	0.798		0.029	0.052	0.564	0.575	
REPEAT	0.009	0.106	0.084	0.933		-0.072	0.139	-0.516	0.608		0.054	0.170	0.317	0.753	
SKIPLATE	0.001	0.044	0.029	0.977		0.024	0.047	0.516	0.608		0.016	0.053	0.290	0.773	
School factors															
CLSIZE	0.041	0.047	0.870	0.389		0.330	0.100	3.291	0.002	*	0.103	0.067	1.530	0.133	
DATA	0.054	0.063	0.858	0.395		-0.148	0.112	-1.320	0.193		-0.183	0.080	-2.270	0.028	*
GOVFUND	-0.017	0.065	-0.257	0.798		-0.047	0.071	-0.663	0.511		0.037	0.062	0.591	0.557	
IMPROVE	-0.060	0.066	-0.918	0.363		-0.163	0.095	-1.712	0.094		0.048	0.132	0.362	0.719	
INTSELFN	-0.144	0.138	-1.043	0.303		0.392	0.264	1.483	0.145		0.784	0.254	3.082	0.003	*
LEAD	-0.027	0.051	-0.529	0.599		-0.012	0.073	-0.171	0.865		0.036	0.061	0.591	0.557	
LOCATE	0.046	0.045	1.021	0.312		0.033	0.077	0.425	0.673		-0.051	0.056	-0.910	0.368	
MONITOR	0.067	0.067	1.003	0.321		0.186	0.129	1.446	0.155		-0.076	0.096	-0.791	0.433	
PROFDEV	0.038	0.051	0.734	0.466		0.125	0.085	1.467	0.149		0.008	0.082	0.102	0.919	
PUBPRIV	0.374	0.160	2.335	0.024	*	0.750	0.310	2.416	0.020	*	-0.074	0.149	-0.494	0.624	
RATCMP1	-0.043	0.047	-0.916	0.365		0.151	0.078	1.924	0.061		0.092	0.065	1.413	0.164	
RATCMP2	0.008	0.064	0.123	0.903		0.000	0.055	0.002	0.999		-0.124	0.122	-1.014	0.316	
SCHAUT	-0.037	0.086	-0.427	0.671		-0.135	0.161	-0.840	0.405		0.276	0.095	2.913	0.005	*
SCHESCS	-0.074	0.116	-0.635	0.529		-0.162	0.191	-0.848	0.401		0.172	0.198	0.866	0.391	
SCHSIZE	0.064	0.047	1.379	0.175		-0.067	0.071	-0.945	0.350		0.075	0.062	1.203	0.235	
STUDHLPN	0.232	0.093	2.507	0.016	*	0.120	0.192	0.624	0.536		-0.045	0.183	-0.244	0.808	
STUDRMN	-0.090	0.121	-0.743	0.461		-0.045	0.167	-0.271	0.787		0.007	0.237	0.031	0.976	
TEACHPART	0.106	0.064	1.640	0.108		0.020	0.094	0.212	0.833		-0.186	0.060	-3.080	0.003	*
XCURR	-0.052	0.058	-0.892	0.377		0.028	0.099	0.285	0.777		-0.081	0.098	-0.825	0.414	
Country controls															
BEL	-0.220	0.142	-1.547	0.129											
ESP	-0.162	0.177	-0.915	0.365											

FIN						0.393	0.257	1.527	0.134						
FRA	-0.164	0.184	-0.888	0.379											
GBR											0.099	0.215	0.462	0.646	
GRC	-0.053	0.231	-0.230	0.819											
HRV						0.186	0.250	0.744	0.460						
IRL											-0.044	0.254	-0.172	0.864	
ITA						0.125	0.210	0.596	0.554						
LTU						0.046	0.308	0.148	0.883						
LUX	-0.343	0.180	-1.898	0.064											
NLD											-0.133	0.252	-0.527	0.601	
QCY	0.076	0.189	0.404	0.688											
SVN						-0.031	0.213	-0.146	0.884						
SWE											0.008	0.163	0.048	0.962	
(Intercept)	-0.899	0.221	-4.072	0.000	*	-1.643	0.319	-5.142	0.000	*	-1.815	0.490	-3.706	0.001	*
Pseudo r2	0.015					0.036					0.024				

4.3 Discussion

Reflecting on the specific research questions this approach sought to address, we conclude:

- It is possible to identify considerable groups of students that achieve academically above what would be expected given their exposure to different education-related adversity factors, without the use of cut-offs around a specific variable. This was achieved through the development of linear regression models, for each Member State, predicting student test scores. Students achieving 1 standard deviation or half a standard deviation (of the mean average PISA score) above what they were predicted by the model are considered resilient to empirically-derived adversity.

- A number of factors are associated with students' deviation-derived resilience status. Factors that were, somewhat, consistent across analysis included students that speak a minority language and attending a school with larger class sizes. Attending a privately operated school was a significant factor when analysis was carried out by Member State groupings.

5. Minority language students

This section focuses on analysis of the academic resilience of minority language students. Minority language speakers are defined as non-migrant background students that speak a different language at home to the one in which the PISA test was administered.
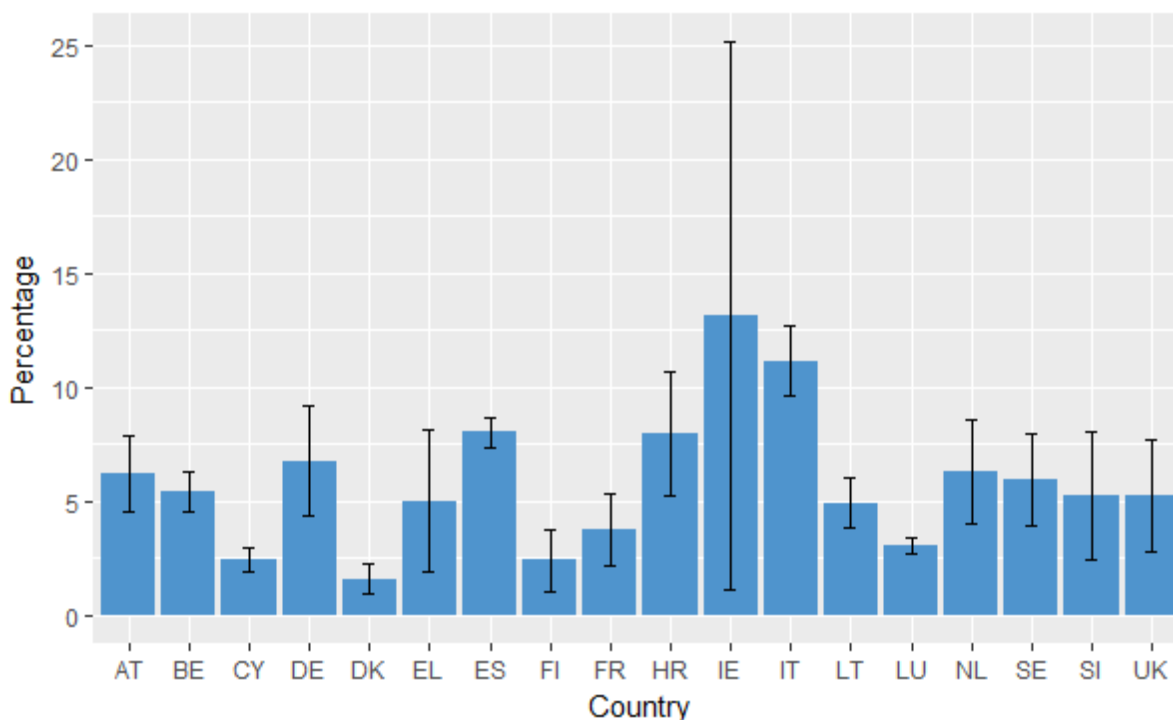
Analysis of minority language students has not been included as the central focus in this study due to the difficulties inherent in reliably defining this group. The PISA variable is based only on asking if the language spoken at home differs from the one of the PISA assessment. Our exploratory analysis has underlined for example that some students classified as being 'minority language' may not be at a particular language disadvantage; for example, students in Spain speaking an officially recognised regional dialect at home were tested in Spanish, or students in Luxembourg speaking Luxembourgish at home and being tested in the school languages of French or German.

Keeping this caveat in mind, we present some initial analyses on minority language speakers in this section. Firstly, we explore the share of resilient minority language students across the EU. Secondly, we consider factors associated with academic resilience for minority language speakers.

5.1 Shares of resilient minority language students

The proportion of resilient minority language students, using the classic approach, across EU Member States was 7.9% (n=892). Figure 5.1 shows the shares of students by Member State. Ireland had the highest share of resilient minority language students. This was followed closely by Italy and Spain (where there is greater confidence in the shares due to larger sample sizes). Denmark had the lowest share of resilient minority language students.

Figure 5.1: Shares of resilient minority language students, by EU Member State

5.2 Share of highly-resilient minority language students

Across EU Member States, 2.2% (n=306) of minority language students were identified as highly-resilient. Figure 5.2 shows the shares of highly-resilient minority language students by Member State. The shares ranged from less than 1% in Denmark and France to 13% in Ireland. Due to small sample sizes, in most cases we cannot be certain that differences between Member States are statistically significant. Furthermore, in terms of absolute numbers, Spain and Italy accounted for most (80%, n=247) highly-resilient minority language students; this further affirms the concerns about the probable heterogeneity of this group (as discussed in the introduction to this section) as Spain and Italy both have regions with prominent regional dialects.

Figure 5.2: Shares of highly-resilient minority language students, by EU Member State
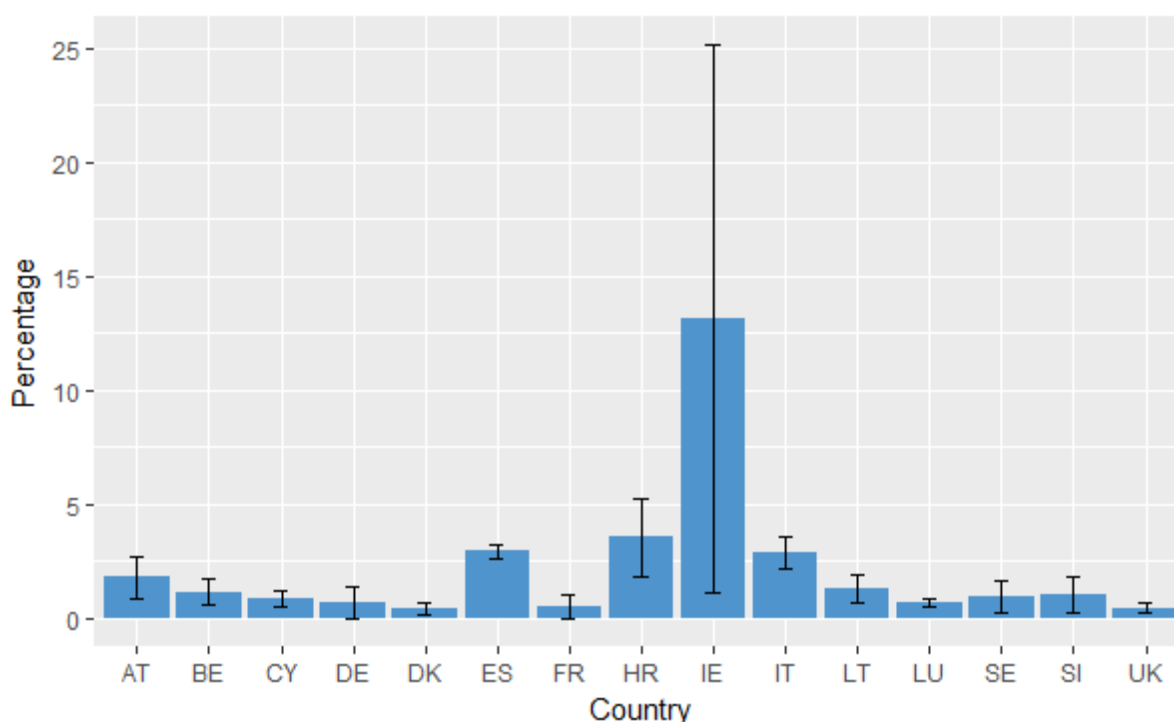
5.3 Factors associated with resilient and highly-resilient minority language students

To understand which student and school level factors are associated with students' resilient status, derived with the classic approach, logistic regression was undertaken. Analysis was conducted on all minority language students. The outcome variable was resilient (binary Y/N). Details of independent variables tested are provided in Section 1 of the technical annex.

In summary, the student factors associated with resilient status for minority language students included:

- Higher academic expectations;
- Being male (due to the focus on mathematics achievement);
- Not repeating a grade.

School factors included:

- Higher proportion of teachers receiving professional development;
- Lower average ESCS.

Regarding highly-resilient minority language students the significant factors at the student and school level were the same as resilient students (above).

5.4 Summary

The shares of resilient and highly-resilient minority language students were similar to that for first-generation migrant students. However, most of these students are concentrated in Member States where there are larger numbers of students that speak prominent regional dialects, but are likely not to suffer a particular disadvantage in being schooled and tested in the official national language(s). This suggests that it may be beneficial in future research to focus more specifically on groups where minority language status may be a disadvantage (e.g. second-generation migrants whose parents speak another language at home, Roma students, etc.).

At the student level, the factors associated with resilient/highly-resilient status for minority language students were similar to those for migrant background students.