

Chapter 2

The resilience of students with an immigrant background

This chapter introduces the concept of resilience as it applies to students with an immigrant background. Resilience is the ability to overcome adversity and adjust positively to a new life. It defines the terms “adversity”, “adjustment” and “vulnerability”, as used in the report, and identifies several of the risk and protective factors that are related to how well – or poorly – students with an immigrant background integrate into their host communities. The chapter concludes with a brief look at the two main sources of data for the report: the Programme for International Student Assessment (PISA) and the European Social Survey (ESS).

An estimated 4.8 million migrants arrived at OECD countries in 2015, an increase of about 10% over the previous year, with family reunification and free movement across borders each accounting for about a third of these entries (OECD, 2016c; OECD, 2015b). The recent wave of migration has reinforced a long and steady upward trend in the share of immigrants in OECD countries, which has grown by more than 30% since 2000 and has become increasingly diverse (OECD/EU, 2015). Over this period, several OECD countries that had previously been the country of origin of many migrants, including Ireland, Italy and Spain, became destination countries. Before the global economic crisis of 2008, immigration rates in these countries were sometimes as high as those of traditional OECD immigration countries (OECD, 2015b).

Children represent a significant portion of global migration flows, especially within refugee populations. According to a 2016 UNICEF report, 1 in 8 migrants worldwide is a child, as is more than one in two refugees – a proportion that has doubled between 2005 and 2015 (UNICEF, 2016). Accommodating the unprecedented inflows of migrant children into education systems is one of the key challenges facing host countries.

Migration flows are already profoundly changing the composition of classrooms in OECD countries. Between 2003 and 2015, the share of students with foreign-born parents rose by four percentage points, on average across OECD countries, and by more than five percentage points in Austria, Belgium, Canada, Ireland, Italy, Luxembourg, New Zealand, Norway, Spain, Sweden, Switzerland, the United Kingdom and the United States. More than one in two students who participated in the 2015 round of the Programme for International Student Assessment (PISA) in Luxembourg, Macao (China), Qatar and the United Arab Emirates had foreign-born parents, as did close to one in three students in Canada, Hong Kong (China) and Switzerland.

While migration flows can create difficulties for host communities, they also represent an opportunity for countries that face ageing native-born populations and the associated threat of labour and skills shortages (Boeri et al., 2012; Cerna, 2016; EMN, 2011; OECD/EU, 2014). Effective education and social policies are necessary to integrate migrant children successfully into society and unlock the potential benefits of migration. Education systems determine immigrants' ability to eventually participate in the labour markets of host countries, contribute to welfare arrangements, and feel part of their communities. The growing share of children among those fleeing conflict (IOM, 2015) has led to a re-examination of how best to integrate foreign-born children into their new communities. This is particularly important given the high likelihood that a large number of young migrants will settle permanently in their country of destination.

This report studies the overall resilience of students with an immigrant background, including academic, social and emotional dimensions, as they integrate into education systems. It aims to identify both the risk factors that prevent immigrant students from successfully integrating and the protective factors that enable these students to thrive. The report is innovative in several respects:

- First, it provides new insights into who has an immigrant background. The report paints a detailed picture of the diversity of circumstances that arise as the face and nature of international migration changes.
- Second, it uses a range of measures – academic, social and emotional, and those related to motivation – when evaluating the ability of different education systems to integrate students with an immigrant background. In recognising that education systems should strive to promote academic achievement and students' well-being, the outcomes of interest in this report are students' ability to achieve at least baseline levels of performance in the core PISA subjects (science, reading and mathematics) and their sense of belonging at school, their satisfaction with life, anxiety at school and their motivation to achieve.
- Finally, the report investigates the cumulative or multiplicative nature of risk and protective factors that affect the outcomes of different groups of students with an immigrant background. Cumulative disadvantage is observed when students with an immigrant background are saddled with more risk factors (or have fewer protective factors) than their native peers. Multiplicative disadvantage is observed when risk factors hinder students with an immigrant background more (and when protective factors help immigrant students less) than they do students without an immigrant background.

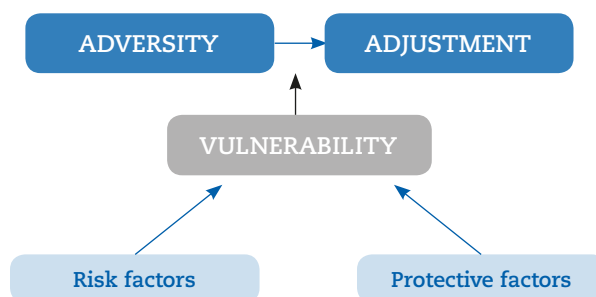
Resilience

The term “resilience” was originally used in physics and engineering to characterise the ability of materials to resume their original shape or condition after being subjected to a shock (Treloar, 1975), and in medicine to describe the ability of patients to recover after traumatic events, such as surgery or accidents (Boyden and Mann, 2005). It is also widely used in ecology (Holling, 1973; Gunderson, 2000) and other system-level domains. The concept of resilience, in the sense used in this report, dates back to the post-World War II period. World War II affected tens of millions of people across the globe, including children. The war left behind orphaned, injured, sick, traumatised and starving children (Werner, 2000). In fact, the United Nations International Children’s Emergency Fund (UNICEF) was founded to address this global emergency (Diers, 2013). Finding ways to help children recover from severe adversity was the main focus of researchers at the time. In this regard, resilience research has its roots in research and theory in child development, clinical sciences and the study of individual differences (Cicchetti, 2013; Evans, Li and Whipple, 2013; Luthar, 2006; Masten, 2013). So how and why is resilience, a term used in such different contexts, relevant in social sciences?

Resilience refers to an individual’s ability to overcome adversity and display positive adjustment (Daniel and Wassell, 2002; Howard et al., 1999). Individuals’ vulnerability to hardship depends not only on the individual himself or herself, but also on his or her environment and the interplay between the two.

Figure 2.1 illustrates the key elements that characterise resilience and how they relate to each other. Adversity refers to external events and circumstances that cause shock to the individual. Adjustment refers to the positive adaptation of the individual who experiences adversity. Vulnerability refers to the likelihood that adversity will lead to positive adjustment or negative outcomes. Risk and protective factors are the host of individual and environmental characteristics that determine an individual’s degree of vulnerability.

Figure 2.1 ■ A graphical description of the elements characterising resilience



The concept of resilience is increasingly used to identify when, how and why people who have been exposed to negative experiences display less vulnerability (Luthar, 2003; Masten, Powell and Luthar, 2003; Rutter, 2006). Resilience expresses individuals’ ability to cope with adverse circumstances. Resilience research provides evidence on how people’s responses to adversity differ. Institutional and social features play a key role in reducing individuals’ vulnerability to adversity: context importantly shapes not only the likelihood that individuals will be exposed to adverse circumstances, but also individual capacity to overcome adversity. In other words, showing that some individuals overcome adversity, and understanding what factors facilitate or hinder individuals’ success in the face of hardship, should not be used as an excuse to abandon efforts aimed at reducing people’s exposure to adverse circumstances and to forge contests that reduce individuals’ vulnerability to adversity. Indeed, it should be used to identify the policies and practices that support and promote individuals’ positive adjustment in the face of adversity.

Past research on student resilience in education settings arose from empirical research in education identifying large socio-economic disparities in academic achievement (Coleman et al., 1966; Peaker, 1971; Jencks, 1972; Crane, 1996; Sutton and Soderstrom, 1999; Martin et al., 2012; Mullis et al., 2012; OECD, 2011; Sandoval-Hernandez and Cortes, 2012; White, 1982; McLoyd, 1998; Buchmann, 2002; Sirin, 2005).

Although most applied work identifies socio-economic disadvantage as a risk factor for poor academic performance, some disadvantaged students beat the odds against them and achieve good academic outcomes despite their background. Resilience research attempts to determine whether certain factors are related to the ability of some disadvantaged students to achieve academically.

Past cross-national analyses of student resilience based on large-scale international assessments such as PISA typically identify adversity in terms of relative socio-economic deprivation. Disadvantaged students are described as those who fall in the bottom quartile of the national distribution of an index designed to capture economic, social and cultural status (the PISA ESCS index) (OECD, 2012; Agasisti et al., 2018). Adjustment is also considered in relative terms and is regarded as students' ability to perform among the top quarter of students internationally in one of the PISA assessment domains (adjusting for the international association between academic achievement and socio-economic status). Resilient students are typically compared to disadvantaged low achievers, students who are also socio-economically disadvantaged, but who fail to achieve at high levels in the PISA test.

This report uses the following definitions for resilience-related terms:

- **Adversity** refers to the process of international migration as it applies to the group of students who either have directly experienced the difficulties associated with having to settle in a new country or have parents who did. While people migrate out of the hope to build a better life for themselves and their loved ones, the act of displacement forces individuals to adapt to a new reality. It can break or loosen individuals' connectedness with their community, and forces them to create new social networks and learn new ways of being and behaving in their host community. Many migrants have to learn a new language; others may face economic hardship and find it difficult to access welfare and social services. Many have fled war, political insecurity or persecution. Most have to negotiate complex identities.
- **Adjustment** refers to children's positive adaptation, both overall and in key areas, namely academic, social, emotional and motivational. Since this study focuses on the role education systems can play in integrating students with an immigrant background, the measures of adjustment considered here reflect the goals and roles of education systems. Thus, in this report, adjustment is manifested in students' acquisition of academic skills and in their social, emotional and motivational well-being. These are key determinants of immigrant children's current well-being. Moreover, they are key indicators of these children's capacity to thrive economically, socially and emotionally as adults.
- **Vulnerability** refers to the likelihood that students with an immigrant background will be able to acquire key academic skills and report good levels of social, emotional and motivational well-being. Implicit in the concept of vulnerability is a comparison with students who did not experience adversity because they or their families do not have an immigrant background.
- **Risk and protective factors** refer to all individual, household, school and system-level characteristics that influence vulnerability because they explain the degree to which students with an immigrant background can be expected to have acquired academic skills and to report social and emotional well-being. The report explicitly considers two mechanisms through which risk and protective factors can determine the outcomes of students with an immigrant background: the extent to which students with an immigrant background are more or less exposed to risk and protective factors than students without an immigrant background are, and the extent to which risk and protective factors are differently related to outcomes, depending on students' immigrant background.

Adversity

Adversity is what must be overcome to display positive adjustment. In the context of this report, having migrated internationally, or having parents who did is the source of adversity. The report does not consider the education consequences for children who had migrated within their country of origin, such as children who moved from one region to another, or who moved from a rural to an urban area (UNESCO, Global Education Monitoring Report, 2015).

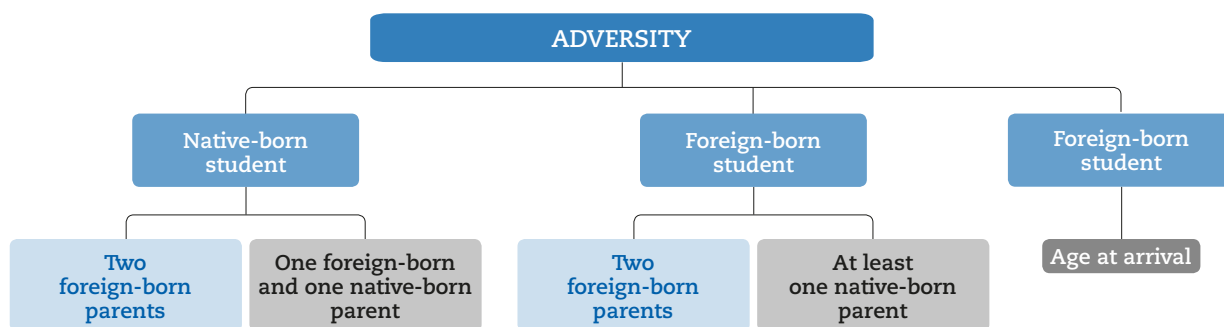
Migration is a life-changing experience that fundamentally reshapes individuals' lives. Researchers identify key stressors that are associated with moving and settling in a new country, including the loss

of close relationships and social networks, housing problems, obtaining legal documentation, learning a new language, changing family roles, and adjusting to new school systems and labour markets (Garza, Reyes and Trueba, 2004; Igoa, 1995; Portes and Rumbaut, 2001; Suarez-Orozco and Suarez-Orozco, 2001; Zhou, 1997). Immigrant children, as dependents of their parents, rarely have much to say about the decision to migrate. They follow their families and bear both the positive and negative consequences of migration (Suarez-Orozco and Suarez-Orozco, 2001). In fact, the hope to build a better future for their children is usually what drives families to migrate to a new country in the first place.

This report considers two key factors that determine the type of adversity children with an immigrant background might suffer: whether the child directly experienced migration or whether the child's parents did and, if the child is foreign-born and directly experienced migration, the age at which he or she migrated. The report distinguishes between first-generation immigrant students (foreign-born students with two foreign-born parents), second-generation immigrant students (native-born students with two foreign-born parents), students of mixed heritage (native-born students with one foreign-born and one native-born parent), and returning foreign-born immigrant students (foreign-born students with at least one native-born parent).

For first-generation immigrant students, an additional factor that defines the level of adversity is the age at which the student migrated. Children who had migrated at an early age often share a life history that is more similar to that of second-generation immigrant students than to that of other first-generation students. By contrast, students who had migrated when they were older often face greater institutional barriers – such as having to adapt to a different education system, and to different ways of being and behaving than those in their country of origin. Students who had migrated at an early age may face another kind of adversity because they do not have long-term memories of and attachments to their parents' country of origin; they may find it difficult to reconcile different identities. Figure 2.2 shows the profiles of migration-related adversity considered in this report.

Figure 2.2 ■ Profile of students with an immigrant background



Adjustment

Key to resilience research is conceptualising and measuring adjustment (Masten, 2011; Rutter, 2012a; Ungar, 2011). Individuals are generally considered to be resilient if they experienced adversity but have “better-than-expected” outcomes. While one line of research has conceptualised “better-than-expected” as achieving a baseline level that is generally not achieved by individuals who have faced hardships (McCormick, Kuo and Masten, 2011), others have considered “better-than-expected” as implying achievement well above the average level of outcomes in various domains.

Identifying the threshold above which an individual facing adversity should be considered as resilient, and the outcomes considered when defining adjustment have important implications for designing the policies and programmes that can mitigate the negative consequences of adversity. Research on student resilience, particularly cross-country research designed to identify the role of education systems (OECD, 2011), considers positive adjustment in terms of subject-specific academic skills. It defines “better-than-expected” outcomes in terms of students’ ability to excel academically despite the hardships they face.

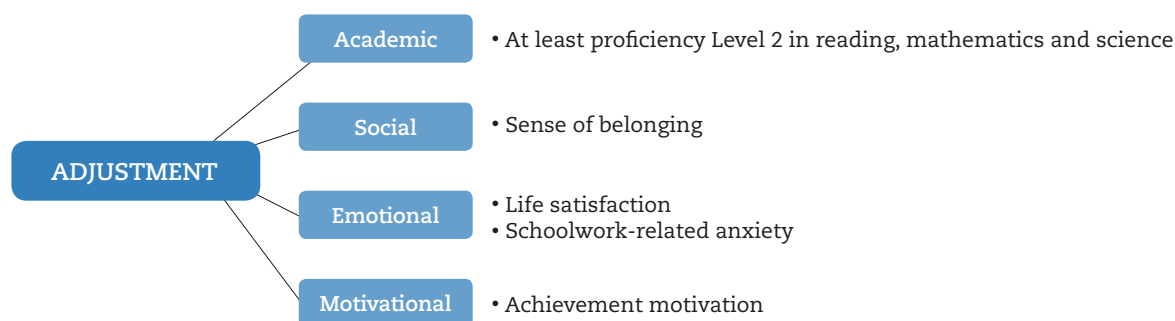
The seminal report on student resilience, which introduced the concept of resilience in the context of PISA – *Against the Odds: Disadvantaged Students Who Succeed in School* (OECD, 2011) – defines student resilience as the ability of students in the bottom quarter of the national distribution of socio-economic status to perform in the top quarter of the international distribution of subject-specific performance, discounted for the association, at the international level, between socio-economic status and subject-specific performance.

In this report, academic resilience refers to students' ability to acquire a strong foundation in the core subjects of reading, mathematics and science – skills needed for a smooth transition from compulsory schooling into further education, training or the labour market. More specifically, positive adjustment requires that a student reaches PISA proficiency Level 2, considered to be the baseline level of proficiency, in those subjects. Longitudinal studies suggest that students who reach the PISA baseline level of proficiency do better in life than those who do not (OECD 2010a; OECD 2012).

The 2009 Canadian Youth in Transition Survey, which followed up on students who were assessed by PISA in 2000, shows that 15-year-olds scoring below Level 2 in reading face a disproportionately higher risk of not participating in post-secondary education and of poor labour-market outcomes at age 19, and even more so at age 21 (OECD, 2010b). A similar longitudinal survey in Switzerland, which followed the PISA 2000 cohort until 2010, shows that students scoring below Level 2 in reading are at high risk of not completing upper secondary education. About 19% of students who had scored at Level 1, and more than 30% of students who had scored below Level 1 had not completed any upper secondary programme by the age of 25, compared to less than 10% of those students who had scored above the baseline level of proficiency in reading (Scharenberg et al., 2014).

Two follow-up studies in Uruguay, based on the 2003 and 2006 PISA cohorts, similarly indicate that students who had scored below Level 2 in the mathematics tests were significantly less likely to complete upper secondary education (Cardozo, 2009) and more likely to have repeated a grade or dropped out of school, even after accounting for other demographic and social differences among students (Ríos González, 2014). A Danish study that linked PISA to the Survey of Adult Skills (a product of the OECD Programme for the International Assessment of Adult Competencies, or PIAAC) also shows that students who had scored below Level 2 in reading in PISA 2000 were more likely to have received income transfers for more than a year between the ages of 18 and 27 – meaning that they were unemployed or ill for long periods (Rosdahl, 2014). And the Longitudinal Study of Australian Youth (LSAY) shows that, in 2013, the 25% of students who had the lowest scores in mathematics in 2003 were more likely to be unemployed or not in the labour force than the second 25% of students (LSAY, 2014).

Figure 2.3 ■ **Adjustment as a multidimensional outcome**



Yet, performance in standardised assessments has been found to explain only so much of students' success later in life (Stankov 1999; Sternberg 1995). In fact, employment and full participation in society require much more than just cognitive abilities (Levin, 2012). Recent theoretical and methodological developments support the need to apply measures of well-being when assessing the efficiency of different policy interventions (see CAE, 2011, also known as the final report of the Stiglitz-Sen-Fitoussi Commission

on the Measurement of Economic Performance and Social Progress). Academic results represent only one dimension of student well-being (Borgonovi and Pál, 2016). Consequently, education systems should also be evaluated in terms of their capacity to develop all aspects of human potential.

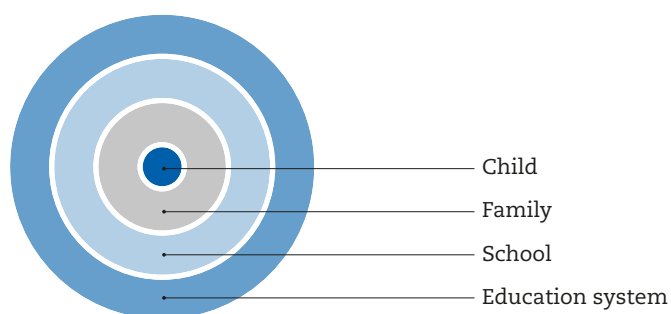
Adaptation therefore encompasses not only students' ability to achieve a baseline level of skills in all core academic subjects, but also their ability to attain baseline levels of self-reported satisfaction with life, social integration and a sense of agency and motivation to achieve – in other words, to be socially, emotionally and motivationally resilient. Figure 2.3 shows the outcomes considered in this report and how overall resilience can be broken down into four dimensions: academic, social, emotional and motivational. Analyses presented in this report identify immigrant students' overall resilience as well as the extent to which they are vulnerable in specific dimensions. By identifying areas of relative strength and weakness in adaptation processes, the report provides detailed information to education policy makers about dimensions of adjustment students struggle with the most.

Vulnerability: Risk and protective factors

Children with an immigrant background are at risk of suffering poor educational outcomes (Fazel and Stein, 2002; Williams, 1991; Wolff and Fesseha, 1999). However, not all do and some children cope successfully in spite of facing adversity (Rutter, 2000; Masten, 2001; Ungar, 2005a; Ungar, 2005b). A key objective of this report is to replace a “deficit model” of students with an immigrant background, in which these students are perceived as a liability for host countries, with a “resource model”, in which these students are regarded as full members of their communities and potential contributors to the economic, social and cultural life of their communities.

The study of resilience is essentially the study of individuals' unique capacity to beat the odds against them and overcome disadvantage and adversity. Individuals vary in their ability to overcome disadvantage because of their willingness and ability to mobilise their own psychological and physical resources, and the resources available in their social and physical environment (Wong, 2008). In other words, in order to understand why student outcomes differ even when students experience similar types of disadvantage, it is important to identify the personality characteristics, institutional and environmental resources that moderate the negative effects of stress (Bernard, 1995; Kirby and Fraser, 1997; Masten, 1994; Werner and Smith, 1992).

Figure 2.4 ■ The multilevel nature of risk and protective factors

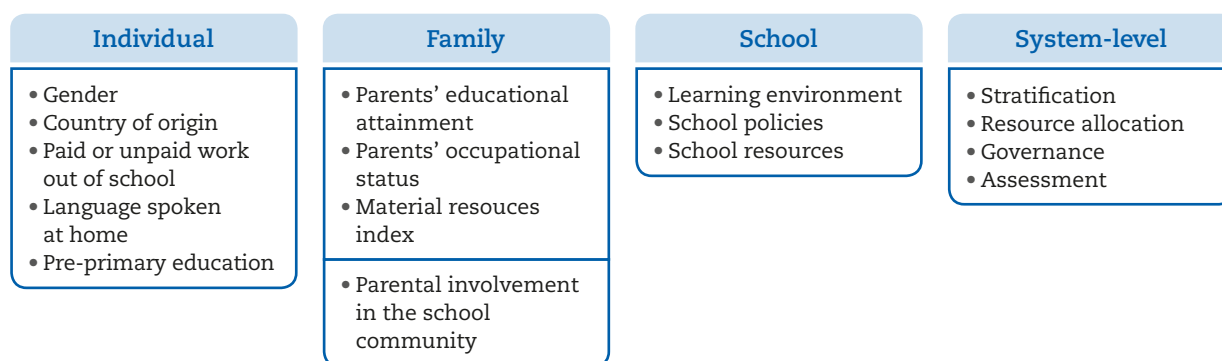


In most cases, researchers identify three sets of risk and protective factors that moderate the effects of adversity and promote academic resilience: attributes of the children themselves; characteristics of their families; and attributes of their wider social environment, which encompasses the school, the neighbourhood and the wider community (Masten and Garmezy, 1985; Werner and Smith, 1982, 1992). Resilience research has shown that some of the risk factors that are generally associated with increased vulnerability to adversity, if experienced at particular times, at specific degrees, and at times during which individuals have sufficient coping mechanisms, can have unexpected “steeling effects” and reduce vulnerability (Rutter, 2012b). Just as vaccinations protect individuals from specific diseases by prompting

immune systems' production of antibodies, so manageable risk factors can help individuals develop effective coping mechanisms. Figure 2.4 illustrates the multilevel nature of risk and protective factors, ranging from individual to system-level factors; Figure 2.5 identifies risk and protective factors examined in this report vis-à-vis immigrant students' likelihood to achieve good education outcomes.

Lerner (2006) argues that the study of resilience requires a multidimensional approach because resilience involves the interaction between individuals and their social and institutional environments. Individual attributes refer to children's characteristics and experiences, family attributes refer to socioeconomic background and parenting related issues, whereas the extra-familial level includes neighbourhood, school and system level related factors (Rutter, 2000; Masten, 2001; Fraser, 2004; Waaktaar and Christie, 2000; Dyregrov, 2000; Raundalen, 2000; Luthar and Cicchetti, 2000). More recently, researchers have also started focusing on the genetic basis of children's well-being (Cloninger, 2004), but this aspect is not examined in this report.

Figure 2.5 ■ Overview of risk and protective factors



Analytical choices taken in this report to study the resilience of students with an immigrant background

When attempting to identify factors that shape the likelihood that students with an immigrant background will display academic, social, emotional and motivational resilience, the central question is: what is the relevant comparison group to evaluate the vulnerability of such students? Standard analyses of the academic resilience of socio-economically disadvantaged students typically compare, within countries, the group of disadvantaged students who are high performers (academically resilient students) with the group of disadvantaged students who are not (disadvantaged low achievers). Across countries, comparisons are conducted considering the overall prevalence of disadvantaged students who perform above a certain threshold.

In this report, multiple comparison groups are considered in order to provide a nuanced picture of the vulnerability experienced by students with an immigrant background from both a national and an international perspective. Underlying differences in the background characteristics of students with an immigrant background that are not captured in the PISA study are also accounted for, to the extent possible. Using multiple comparison groups results in a more detailed picture of the success of different education systems in promoting the overall resilience, as well as adjustment in different dimensions of well-being, of different groups of students. For example, by comparing the percentage of students with an immigrant background who are academically resilient in country A to the percentage of students with an immigrant background who are academically resilient in country B, the report illustrates the capacity of education systems to promote absolute levels of academic resilience. But in the absence of a relative approach through which students with an immigrant background in country A are compared to students without an immigrant background in the same country, it is impossible to capture the disadvantage that students with an immigrant background may face in the long term when labour market and social opportunities are determined by relative rather than absolute performance levels.

To account for broad unobserved differences across different groups of students with an immigrant background, students who have a direct experience of migration (because they are foreign-born) are compared with those who have an indirect experience of migration (because they have foreign-born parents). The outcomes of students from different countries of origin who settled in the same country of destination are compared with those of students from the same country of origin who settled in different countries of destination to evaluate the ability of an education system to cater to the specific needs of different populations, or of different education systems to promote integration of similar immigrant groups. In each case, comparisons also consider students' socio-economic status since that varies markedly across groups and is an important determinant of academic, social, emotional and motivational well-being.

The following six comparison groups are considered when identifying migration-specific adversity, and both relative and absolute vulnerability from national and international perspectives:

- students with an immigrant background in other countries
- students without an immigrant background in the same country
- different groups of students with an immigrant background
- students from the same country of origin who did not migrate
- students from the same country of origin who migrated to different countries
- students from different countries of origin who migrated to the same country of destination.

Data sources

The report is primarily based on data from the Programme for International Student Assessment (PISA). Data from the European Social Survey (ESS) are used to complement PISA data in dedicated Spotlights in Chapters 3 and 8.

The Programme for International Student Assessment

PISA is a triennial survey of 15-year-old students and was first implemented in 2000. PISA assesses the extent to which 15-year-old students, near the end of their compulsory education, have acquired key knowledge and skills that are essential for full participation in modern societies. The assessment focuses on the core school subjects of science, reading and mathematics. Students' proficiency in an innovative domain is also assessed (in 2015, this domain is collaborative problem solving). The assessment does not just ascertain whether students can reproduce knowledge; it also examines how well students can extrapolate from what they have learned and can apply that knowledge in unfamiliar settings, both in and outside of school. This approach reflects the fact that modern economies reward individuals not for what they know, but for what they can do with what they know.

The triennial nature of the study means that PISA can be used to monitor trends in students' acquisition of knowledge and skills across countries and in different demographic subgroups within each country. Forty-three countries and economies took part in the first assessment and by 2015 this number had grown to 72 countries and economies. Approximately 540 000 students completed the assessment in 2015, representing about 29 million 15-year-olds.

In addition to all OECD countries, the survey has been or is being conducted in:

- **East, South and Southeast Asia:** Beijing, Shanghai, Jiangsu and Guangdong (China), Hong Kong (China), Indonesia, Macao (China), Malaysia, Singapore, Chinese Taipei, Thailand and Viet Nam.
- **Central, Mediterranean and Eastern Europe, and Central Asia:** Albania, Bulgaria, Croatia, Georgia, Kazakhstan, Kosovo, Lebanon, Lithuania, the Former Yugoslav Republic of Macedonia, Malta, Moldova, Montenegro, Romania and the Russian Federation.
- **The Middle East:** Jordan, Qatar and the United Arab Emirates.
- **Central and South America:** Argentina, Brazil, Colombia, Costa Rica, Dominican Republic, Peru, Trinidad and Tobago, Uruguay.
- **Africa:** Algeria and Tunisia.

In each round of PISA, one of the core domains is tested in detail, taking up nearly half of the total testing time. The major domain in 2015 was science, as it was in 2006. Reading was the major domain in 2000 and 2009, and mathematics was the major domain in 2003 and 2012. With this alternating schedule of major domains, a thorough analysis of achievement in each of the three core areas is presented every nine years; an analysis of trends is offered every three years.

The *PISA 2015 Assessment and Analytical Framework* (OECD, 2016a) presents definitions and more detailed descriptions of the domains assessed in PISA 2015:

- **Science literacy** is defined as the ability to engage with science-related issues, and with the ideas of science, as a reflective citizen. A scientifically literate person is willing to engage in reasoned discourse about science and technology, which requires the competencies to explain phenomena scientifically, evaluate and design scientific enquiry, and interpret data and evidence scientifically.
- **Reading literacy** is defined as students' ability to understand, use, reflect on and engage with written texts in order to achieve one's goals, develop one's knowledge and potential, and participate in society.
- **Mathematical literacy** is defined as students' capacity to formulate, employ and interpret mathematics in a variety of contexts. It includes reasoning mathematically and using mathematical concepts, procedures, facts and tools to describe, explain and predict phenomena. It assists individuals in recognising the role that mathematics plays in the world and to make the well-founded judgements and decisions needed by constructive, engaged and reflective citizens.

The main PISA instruments are a two-hour assessment and a series of background questionnaires. Until 2012 the PISA assessment was delivered through paper-and-pencil booklets. For the first time, PISA 2015 delivered the assessment of all subjects via computer. Paper-based assessments were provided for countries that chose not to test their students by computer, but the paper-based assessment was limited to questions that could measure trends in science, reading and mathematics performance.

To gather contextual information, PISA 2015 asked students and the principal of their school to respond to questionnaires. The student questionnaire took about 35 minutes to complete; the questionnaire for principals took about 45 minutes to complete. The *PISA 2015 Assessment and Analytical Framework* (OECD, 2016a) presents the questionnaire framework in detail. The questionnaires from all assessments since PISA's inception are available on the PISA website: www.pisa.oecd.org.

Participating students also answered a background questionnaire, which was designed to take 35 minutes to complete. The questionnaire sought information about the students themselves, their homes, and their school and learning experiences. School principals completed a questionnaire that covered the school system and the learning environment. For additional information, some countries/economies decided to distribute a questionnaire to teachers. In some countries/economies, optional questionnaires were distributed to parents, who were asked to provide information on their perceptions of and involvement in their child's school, their support for learning in the home, and their child's career expectations, particularly in science. Data from the parental questionnaire were used in this report. Countries could choose two other optional questionnaires for students: one asked students about their familiarity with and use of information and communication technologies (ICT); and the second sought information about students' education to date, including any interruptions in their schooling, and whether and how they are preparing for a future career. Data from the educational careers questionnaire were used in this report.

The contextual information collected through the student, school and optional questionnaires are complimented by system-level data. Indicators describing the general structure of the education systems, such as expenditure on education, stratification, assessments and examinations, appraisals of teachers and school leaders, instruction time, teachers' salaries, actual teaching time and teacher training are routinely developed and applied by the OECD (e.g. in the annual OECD publication, *Education at a Glance*). These data are extracted from *Education at a Glance 2016* (OECD, 2016b), *Education at a Glance 2015* (OECD, 2015a) and *Education at a Glance 2014* (OECD, 2014) for the countries that participate in the annual OECD data collection that is administered through the OECD Indicators of Education Systems (INES) Network. For other countries and economies, a special system-level data collection was conducted in collaboration with PISA Governing Board members and National Project Managers.

Differences between countries in the nature and extent of pre-primary education and care, in the age at entry into formal schooling, in the structure of the education system, and in the prevalence of grade repetition mean that school grade levels are often not good indicators of where students are in their cognitive development. To better compare student performance internationally, PISA targets students of a specific age. PISA students are aged between 15 years 3 months and 16 years 2 months at the time of the assessment, and have completed at least 6 years of formal schooling. They can be enrolled in any type of institution, participate in full-time or part-time education, in academic or vocational programmes, and attend public or private schools or foreign schools within the country. Using this age across countries and over time allows PISA to compare consistently the knowledge and skills of individuals born in the same year who are still in school at age 15, despite the diversity of their education histories in and outside of school.

The population of PISA-participating students is defined by strict technical standards, as are the students who are excluded from participating. The overall exclusion rate within a country was required to be below 5% to ensure that, under reasonable assumptions, any distortions in national mean scores would remain within plus or minus 5 score points, i.e. typically within the order of magnitude of 2 standard errors of sampling. Exclusion could take place either through the schools that participated or the students who participated within schools.

There are several reasons why a school or a student could be excluded from PISA. Schools might be excluded because they are situated in remote regions and are inaccessible, because they are very small, or because of organisational or operational factors that precluded participation. Students might be excluded because of intellectual disability or limited proficiency in the language of the assessment.

The fact that the PISA target population covers 15-year-olds who are enrolled in school, have reasonable language proficiency has implications for results presented in this report, since many recently arrived immigrants were excluded from the PISA target population (see Chapter 3 for a detailed description).

European Social Survey

The European Social Survey (ESS) is an academically driven cross-national survey that has been mapping attitudes and behavioural changes in Europe's social, political and moral climate since its establishment in 2001.

The survey conducts face-to-face interviews every two years with newly selected, cross-sectional samples that are representative of all persons above the age of 14 and who are resident within private households in each country. The sample size requested to participating countries is at least 1 500 respondents, although for countries with smaller populations the number of respondents can be smaller. The first round was conducted in 2002 in 22 countries. Since then around 350 000 face-to-face interviews have been carried out and over 35 countries have participated in at least one ESS round. Participating countries include Albania, Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Kosovo, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

The questionnaire consists of a main core section of questions that have been administered in every ESS round and are thus easily comparable over time. These questions were developed following the recommendations made by academic experts who were consulted by the Core Scientific Team during the early planning stages of the ESS. The core modules contain questions aimed at identifying individuals' attitudes towards the media, health and wellbeing, trust in institutions and governments, education and occupation, social capital and social trust, household circumstances, citizen involvement and democracy, social exclusion, political values and engagement, immigration and crime. In addition to questions on attitudes and dispositions, the ESS contains information on socio-demographic variables such as respondents' ethnic and immigrant background, household income, level of education, employment and occupational status of the respondent, his/ her parents and partner.

In addition to the 'core' modules that are administered in each round, multinational teams of researchers based in ESS countries were selected to contribute to the design of additional 'rotating questionnaires'.

“Rotating questionnaires” that have been administered so far include questions on citizen involvement, health and care, economic morality, family, work and wellbeing, timing of life, personal and social wellbeing, welfare attitudes, ageism, trust in the police and courts, democracy, immigration, social inequalities in health and attitudes to climate change and energy security. Some of these topics have been included in more than one ESS round.

ESS data are freely accessible for academics, policymakers and civil society and there are more than 100 000 registered users of the data. These data are used to develop soundly-based indicators of national progress, based on citizens’ perceptions and judgements of key aspects of their societies. They also serve to help researchers and policymakers identify trends in social structure, conditions and attitudes in Europe and to interpret how European societies are changing in social, political and moral terms.

The latest available ESS data are from round 8, which contains data collected in 2016 in 23 European countries. Data from ESS8 for 18 countries were released in October of 2017.

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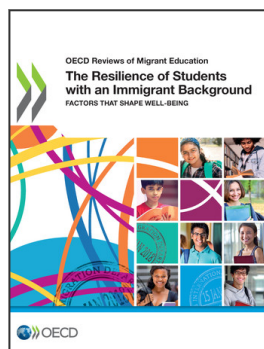
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