3 Lifelong learning trajectories: The transition from compulsory schooling to young adulthood

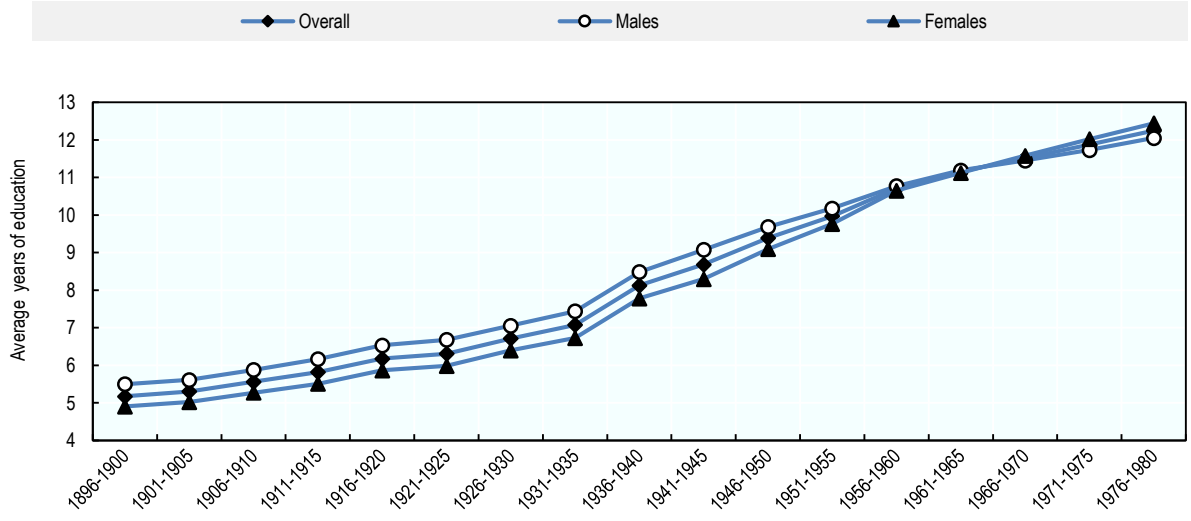
This chapter examines the accumulation of information-processing skills over the life course, with a particular emphasis on the transition between the end of compulsory schooling and young adulthood. It highlights differences across countries in literacy achievement between age 15 and ages 26-28 among the overall population, and among high and low achievers. It illustrates differences in achievement growth across youngsters from families with tertiary-educated parents and those coming from families with parents who achieved at most an upper-secondary degree. It considers the factors associated with the acquisition of skills at a young age, with a particular emphasis on learning opportunities that occur in employment, education and training. The chapter concludes by examining secondary students' attitudes and expectations for their future, as well as the opportunities allowing them to make informed educational and career choices.

Introduction

The framework developed in Chapter 1 suggests it is crucial for governments to ensure that individuals reach a high level of foundation skills by early adulthood. Individuals must invest in lifelong learning to maintain high levels of foundation skills, acquire complementary technical skills, along with job-specific knowledge and expertise that will help them adapt to technological and social transformations. In the past, education systems relied on compulsory schooling to enable all individuals to reach an adequate level of foundation skills to meet the needs of the labour market, with only few individuals progressing to post-secondary education. Individuals who pursued tertiary qualifications were typically those who entered professions (such as medicine, teaching and law) requiring specialised knowledge and skills immediately upon entry, or sought to enhance their social status.

Figure 3.1 shows long-term trends in the average years of schooling attended by cohorts of individuals over the 20th century, as along with the percentage of the adult population from the same birth cohorts in OECD countries who completed a tertiary degree. The results depict a marked increase in investments in initial education and training, especially for individuals who would have been around 15 in the 1950s. Following the Second World War, geopolitical, technological and social transformations led many countries that are now part of the OECD to invest in developing a skilled population while contributing to reconstruction. The trend continued well into the second half of the 20th century and the early 21st century.

Figure 3.1. OECD average long-term trends in years of education completed, overall population and by gender



Note: The figure shows the OECD-average of completed years of education. The values are simple averages over countries without weighting by population.
Source: Adapted from Barro and Lee (2013[1]), "A new data set of educational attainment in the world, 1950-2010," http://dx.doi.org/10.1016/j.jdeveco.2012.10.001.

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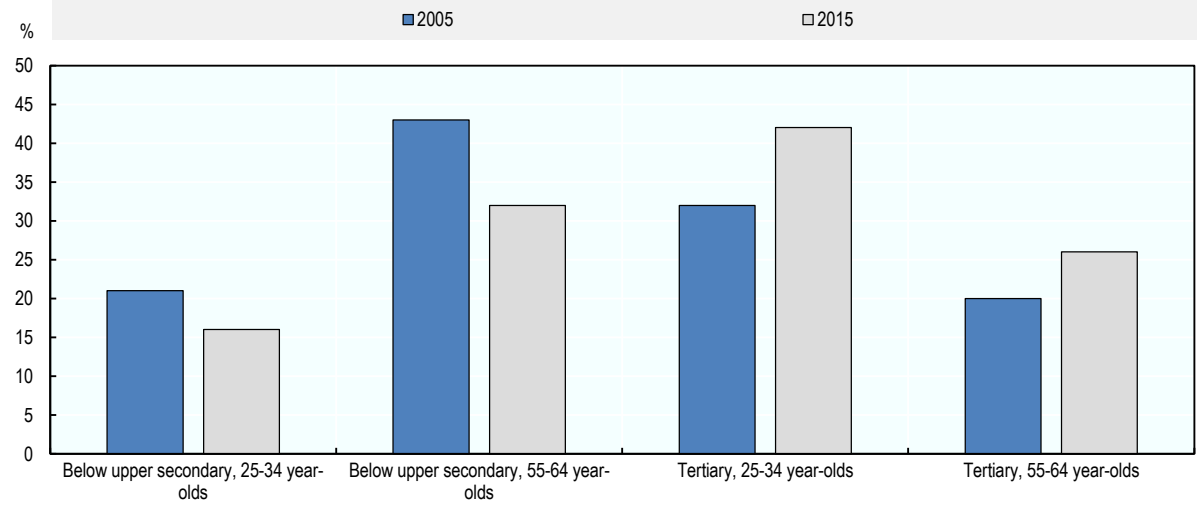
The learning opportunities available to individuals after compulsory schooling can determine their economic, social and labour-market outcomes. In the not so recent past, 15 was close to the age at which young people – even those who had decided to continue their education beyond the compulsory minimum

– completed their studies. Over the last 30 years, however, OECD countries have experienced a major expansion in educational participation and attainment: people have been spending more time in education and training, delaying their entry into the full-time labour market. In many countries today, a 15-year-old student can expect to remain in education for another 5-10 years.

Figure 3.2 presents data on trends in educational attainment between 2005 and 2015 for the birth cohorts aged 25-34 and 55-64 in the two reference years. In 2005, as many as 21% of 25-34 year-olds had not completed upper-secondary education; by 2015 this percentage had dropped to 16%. In the older cohort, 43% of 55-64 year-olds had not completed an upper-secondary degree by 2005; however, this percentage had dropped to 32% by 2015. Over the same period, an increasing proportion of individuals participated in tertiary education: in 2005, only 20% of 55-64 year-olds had obtained a tertiary degree, compared to 26% by 2015. Among the younger cohorts, 32% of 25-34 year-olds had obtained a tertiary degree in 2005, a percentage that had risen to 42% by 2015.

Figure 3.2. Trends in educational attainment between 2005 and 2015 in OECD countries, by age group

Percentage of adults, by age group



Note: Each bar represents the share of individuals within the given age group who completed the given qualification. The figure compares 2005 and 2015.
Source: OECD (2016[2]), *Education at a Glance 2016: OECD Indicators*, https://dx.doi.org/10.1787/eag-2016-en.

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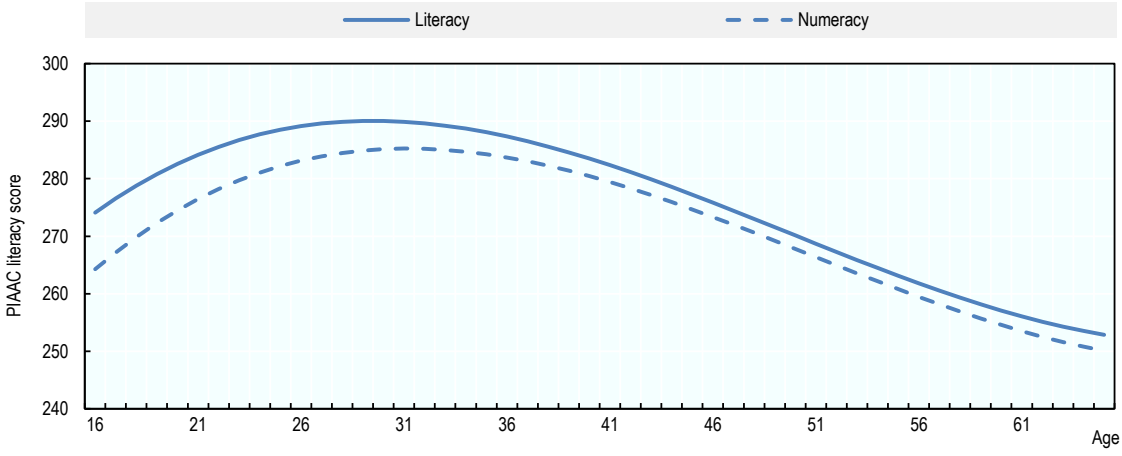
Broad socio-economic and technological transformations are resulting in longer working lives, a greater need for skilled workers and changing skill requirements. These new circumstances are producing new policy objectives, including 1) ensuring that children reach the end of compulsory school with high levels of foundation skills and attitudes associated with a lifetime interest and ability to acquire new skills and knowledge, and 2) ensuring that school leavers make the most of post-compulsory learning opportunities.

Such investments are important if individuals are to keep improving their foundation skills into young adulthood and beyond. Evidence from the Survey of Adult Skills, a product of the Programme for the International Assessment of Adult Competencies (PIAAC indicates that literacy levels only peak around the age of 30 (Figure 3.3)). This evidence is based on cross-sectional data, thus confounding ageing effects with period and cohort effects. However, because of changes in levels of educational attainment,

older individuals captured in cross-sectional studies differ from younger cohorts, not only because of age, but also because of broad changes in levels of educational attainment, work patterns, etc.

Longitudinal studies have confirmed cross-sectional data on skill depreciation. Recent longitudinal evidence on how skills change over adults' lives as a function of ageing and experience was developed using data on individual performance in professional chess tournaments over the past 125 years (Strittmatter, Sunde and Zegners, 2020[3]). This evidence allowed mapping changes in individuals' abilities as they grew older, using an objective measure of cognitive skills – their proficiency in chess. Results validate the hump-shape distribution illustrated in Figure 3.3 (Strittmatter, Sunde and Zegners, 2020[3]).The evidence further indicates a long-run shift: other things being equal, individuals from younger cohorts display higher proficiency than individuals from older cohorts did at the same age. This shift could be explained by the better education enjoyed by younger cohorts.

Figure 3.3. Age-proficiency profiles in literacy and numeracy in the Survey of Adult Skills (PIAAC), OECD average



Note: The figure illustrates the relationship between age and literacy and numeracy.
Source: Paccagnella, M. (2016[4]), "Age, ageing and skills: Results from the Survey of Adult Skills", https://dx.doi.org/10.1787/5jm0q1n38lvc-en.

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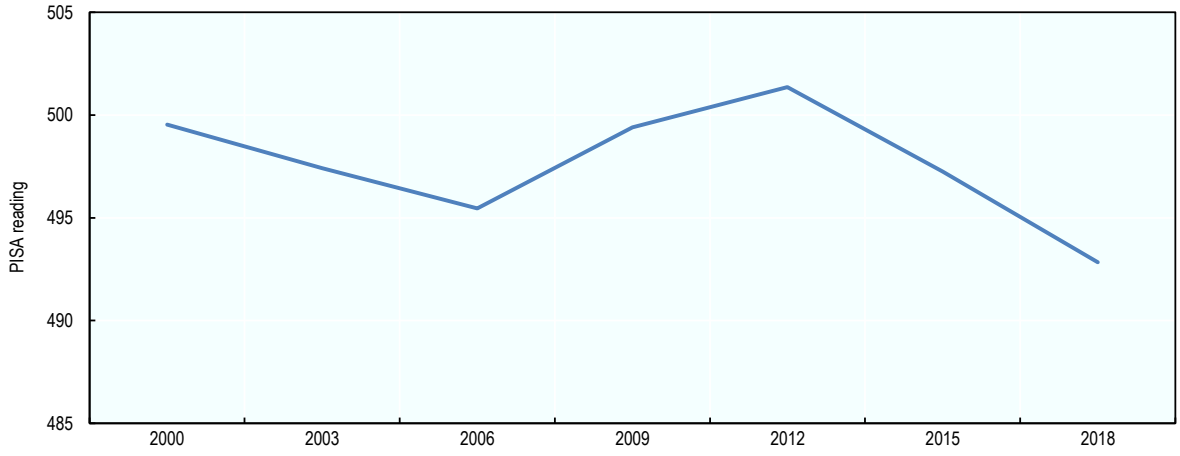
Skills, attitudes and dispositions are developed over the life course. They are also transmitted across generations, extending the reach and relevance of investments in education and training beyond the life of any single individual. Crucially, the effectiveness of individuals' learning investments, and the ease with which they are able to maintain, upgrade or acquire new skills, depend on their experience with prior learning. In the early years, such experience largely rests on the skills and education of the previous generation, leading to the intergenerational transmission of educational advantage. Children from households with high levels of skills and human capital are generally more likely to accumulate skills that will enable them to flourish. However, the degree to which family determines skill development and lifelong learning opportunities varies in different contexts and education systems. At later stages, prior learning becomes progressively more important in shaping an individual's learning trajectory.

Evidence from the Programme for International Student Assessment (PISA), conducted every three years in a growing number of education systems worldwide, allows mapping how the literacy skills of individuals leaving compulsory schooling have changed between 2000 and 2018. The results reveal a worrying trend: mean literacy achievement over 2000-18 decreased by around 7 score points on the PISA scale, entirely owing to a steep decline in the mean literacy achievement of the lowest-achieving students. Figure 3.4 illustrates the evolution in literacy achievement over successive PISA cycles in the 23 OECD countries

that participated in all seven editions of the study. Figure 3.5 shows that the change in PISA scores between 2000 and 2018 primarily stemmed from a decline at the bottom tail of the literacy achievement distribution.

Figure 3.4. Trends in mean literacy achievement in PISA, OECD average



Note: The figure shows the OECD average of PISA reading score for successive cohorts of 15-year-old students tested between 2000 and 2018.
Source: OECD (2019[5]), *PISA 2018 Results (Volume I): What Students Know and Can Do*, https://dx.doi.org/10.1787/5f07c754-en.

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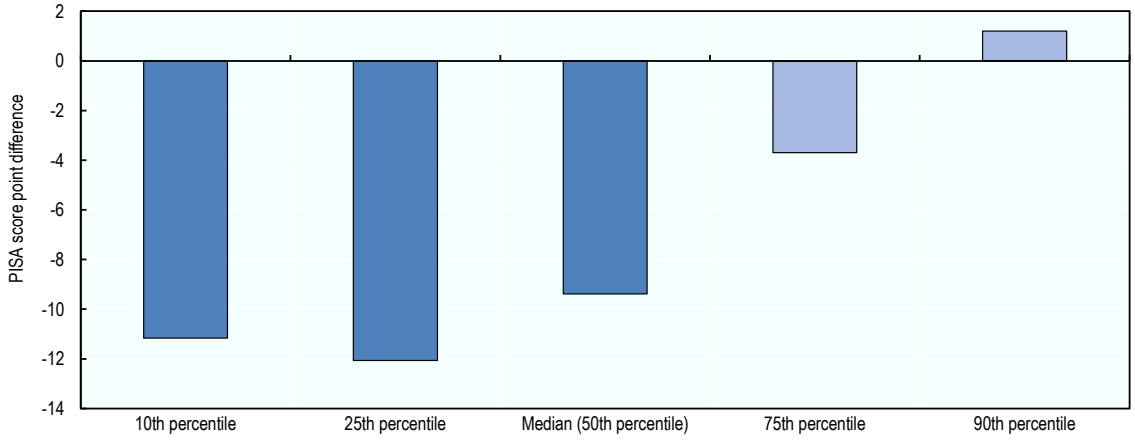
Figure 3.5. Change in literacy achievement among 15-year-old students between 2000 and 2018, OECD average, by percentile of achievement



Note: Results indicate the change (2000-18) in the literacy achievement of students at each percentile depicted. Results represent average values for the 23 countries with available data in all cycles between 2000 and 2018. A darker colour denotes a difference between 2000 and 2018 that is statistically significant at the 5% level.
Source: OECD (2019[5]), *PISA 2018 Results (Volume I): What Students Know and Can Do*, https://dx.doi.org/10.1787/5f07c754-en.

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This chapter considers how countries can ensure that individuals reach a high initial level of foundation skills, to ensure that the transition between adolescence and young adulthood from compulsory schooling to further education and training is marked by growth in achievement. It considers systems that effectively promote achievement growth, and countries in which achievement growth in young adulthood favours socio-economically advantaged or disadvantaged youth. The chapter then presents evidence on factors – such as engagement in education, training or the labour market – associated with smoother transitions, mapping which countries offer youngsters orientation and guidance.

Lifelong learning and transitions

Certain life stages play an important role in shaping individuals' potential learning pathways, both in terms of depth and breadth of learning. To some extent, such stages are biologically determined and reflect maturation processes induced by brain plasticity and general cognitive functions, as well as emotional and affective reactions to environmental stimuli. However, education and training policies, labour-market policies, and social and welfare policies can facilitate (or hinder) the influence of particular life stages on learning pathways, determining the extent to which different individuals are able to acquire new skills and develop new attitudes and dispositions throughout their lives.

Early childhood is an important phase, during which individuals can build strong foundations and develop cognitive functions, as well as the socio-emotional and motivational skills needed to engage in lifelong learning (see Chapter 2). A growing body of evidence details those interventions that can best promote skill development among young children, underpinning their inclination to become lifelong learners. However, cross-country comparable data at young ages remain scarce. The OECD aims to remedy this gap by contributing solid frameworks to acquire and analyse such data (OECD, 2020[6]; OECD, 2017[7]).

Formal education stimulates skill development, building on individuals' readiness to learn early in life and preparing them to participate in the labour market and society. In the schooling years, formal classroom learning is the primary form of learning, although informal and non-formal learning accompany formal learning processes. Knowledge and skills grow rapidly during the schooling years, and the compulsory nature of participation in schooling can stem the evolution of socio-economic differentials in achievement. Empirical evidence from countries performing detailed monitoring of education systems, including individual-level longitudinal follow-ups, suggests that in many contexts disparities are well-established before schooling starts and do not grow – or grow only moderately – during the school years (Duncan and Magnuson, 2013[8]; Skopek and Passaretta, 2020[9]).

As important as the early years are, the teenage years and early adulthood mark a second period of rapid and profound evolutions. These include both biological transformations and changes in individuals' agency over their learning trajectories. Schooling ceases to be compulsory, and individuals and their families are able to make a growing number of choices concerning their learning pathways. Such decisions involve the overall quantity and content of learning, and whether it occurs in formal, informal or non-formal settings. The intended learning trajectories also rely increasingly on people – including trainers in vocational education and training (VET) institutions and supervisors or colleagues in work settings, when learning takes place informally – who are less subject to monitoring than school teachers, and for whom training others is only a part-time occupation.

While biological changes are universal, agency acquisition differs greatly depending on individual countries' social and institutional features. These features often interact with individuals' educational, social, economic and cultural capital derived from their family background. From the teenage years onwards, opportunities for skill development become highly differentiated. Some individuals participate in formal learning through adult education and training, while others rely more on formal and informal learning opportunities in the labour market and everyday life. The manner in which differentiation shapes

individuals' lifelong learning trajectories can vary markedly across countries, and across groups of individuals within each country.

Mapping what occurs across countries and socio-economic groups during the transition from the teenage years to young adulthood is, therefore, crucial. This stage represents the last opportunity for countries to promote foundation skills on a large scale, remedying any failures that occurred during the school years. Countries can also ensure that individuals transition into a period characterised by cognitive decline from higher initial levels of foundation skills acquired in young adulthood. Although individuals can develop information-processing skills beyond young adulthood, successful skill development in adulthood and old age requires considerable investment and effort.

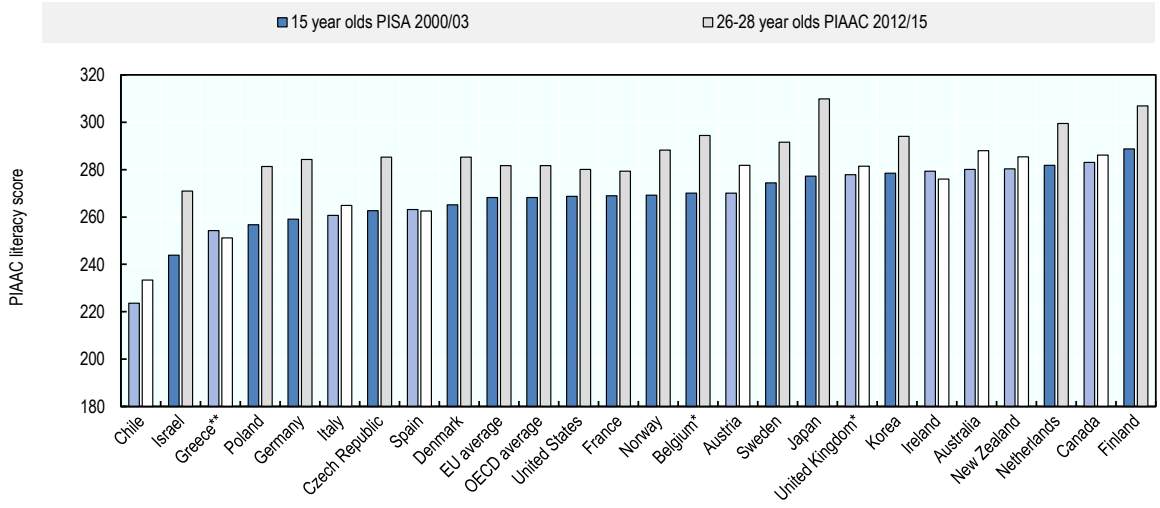
This chapter presents evidence on differences in overall patterns of achievement growth between the end of compulsory schooling and young adulthood, both overall and across different groups of individuals who can rely on different levels of cultural and educational capital. It explores the factors that may explain differences in achievement growth across countries and population groups within countries. Prominent factors are the support individuals receive during the transition, and their eventual participation in formal, informal and non-formal learning opportunities.

Country differences in achievement growth between ages 15 and 27

Figure 3.6 illustrates the evolution in literacy proficiency among 15-year-olds tested in PISA in 2000 and the same birth cohort tested in the Survey of Adult Skills (PIAAC) in 2012 at around age 27 (the results presented refer to 26-28 year-olds, but the tables available on line present estimates for age 27 among a wider band of 25-29 year-olds), as well as the evolution in numeracy proficiency. The results indicate that across OECD countries with available data, individuals' literacy achievement between the ages of 15 and 27 grew on average from 268 for 15-year-olds to 282 for 27-year-olds – an increase of 14 points on the PIAAC literacy scale, or around 30% of a standard deviation. However, Figure 3.6 also identifies a large heterogeneity in achievement growth across the 24 countries examined.

Some of the countries with the lowest levels of literacy achievement among 15-year-olds in 2000 experienced no statistically significant changes in mean literacy achievement. In Greece and Spain, estimated growth in achievement was close to zero (although imprecisely estimated). Yet achievement growth was also low (and not statistically different from zero) in Australia and Canada – two of the countries with the highest levels of mean literacy achievement among 15-year-olds in 2000. Similarly, some of the countries with the largest improvements, such as Israel, Germany and Poland, showed below-average mean achievement in 2000. Japan had the most marked growth in achievement, corresponding to 31 points on the PIAAC scale, or around 65% of a standard deviation – an improvement on the already high levels of achievement recorded at age 15. Other sections in this chapter examine the extent to which these general patterns apply to specific population groups. They also observe which factors explain the observed differences across countries and could be leveraged to promote achievement growth between adolescence and young adulthood.

Figure 3.6. Achievement growth in literacy between ages 15 and 27, by country



Note: Countries are sorted in ascending level of achievement among 15-year-olds. Differences between age 15 and ages 26-28 that are not statistically significant at the 5% level are marked in a lighter tone. PISA reading scores are expressed in PIAAC literacy scores, following Borgonovi et al. (2017[10]) and based on the methods described in Box 3.1. Robustness checks and results for numeracy are available in the supplementary online tables for Chapter 3. See Annex Table 3.A.1. In PISA 2000, the United Kingdom and the Netherlands fell short of the minimum response rate requirements. Information provided by the United Kingdom led to the assessment that response bias was likely negligible. No similar information was provided by the Netherlands. PISA data for Chile and Greece refer to 2003. PIAAC data for Chile, Greece, Israel, New Zealand refer to 2015. How concordance scores between PISA and PIAAC were derived is described in Box 3.1.

* In PIAAC, data for Belgium refer only to Flanders and data for the United Kingdom refer to England and Northern Ireland jointly. The relevant estimated PIAAC score for Flemish community of Belgium in PISA 2000 is 282 and the PIAAC score difference between 15 and 27-year-olds corresponds to 12 points.

**The data for Greece include a large number of cases (1 032) in which there are responses to the background questionnaire but where responses to the assessment are missing. Proficiency scores have been estimated for these respondents based on their responses to the background questionnaire and the population model used to estimate plausible values for responses missing by design derived from the remaining 3 893 cases.

Source: OECD (2000[11]), *PISA database 2000;* https://www.oecd.org/pisa/data/database-pisa2000.htm; OECD (2003[12]), *PISA database 2003;* https://www.oecd.org/pisa/data/database-pisa2003.htm; OECD (2012[13]; 2015[14]), *Survey of Adult Skills (PIAAC) databases*, http://www.oecd.org/skills/piaac/publicdataandanalysis/.

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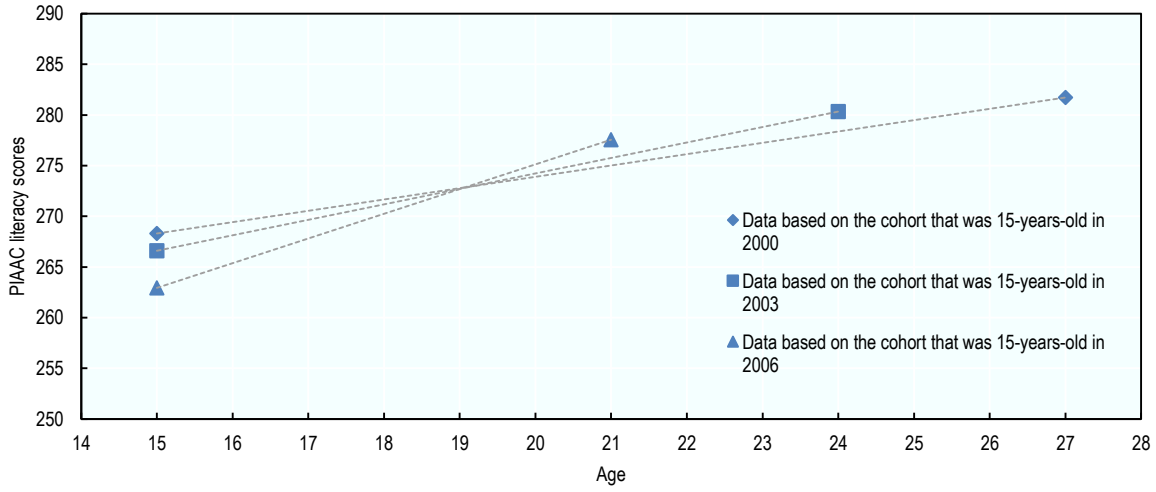
Figure 3.7 presents the mean literacy achievement of successive cohorts surveyed in PISA in 2000, 2003 and 2006 at age 15, and their respective level of literacy achievement at ages 21, 24 and 27. The results show that on average across OECD countries with available data, the literacy achievement of 15-year-olds declined (by 5 score points or around 10% of a standard deviation) between 2000 and 2006. Moreover, the estimated achievement growth at age 21 for the PISA cohort surveyed in 2006 was similar to the estimated achievement growth for the PISA 2000 cohort at age 27, corresponding to 15 score points. These results suggest that most of the growth in achievement between the ages of 15 and 27 occurs in the years immediately following the end of compulsory schooling.

Figure 3.7. A comparison of achievement growth among cohorts of 15-year-olds in 2000, 2003 and 2006, OECD average



Note: The three lines illustrate mean literacy achievement on the PIAAC literacy scale of successive birth cohorts captured for the first time at age 15 in the PISA study. PISA reading scores are expressed in PIAAC literacy scores, following Borgonovi et al. (2017[10]) and based on the methods described in Box 3.1. The supplementary online tables for Chapter 3 present the full results. See Annex Table 3.A.1.
Source: OECD (2000[11]), *PISA database 2000*, http://www.oecd.org/pisa/data/database-pisa2000.htm; OECD (2003[12]); *PISA database 2003,* http://www.oecd.org/pisa/data/database-pisa2003.htm; OECD (2006[15]); *PISA database 2006*, http://www.oecd.org/pisa/data/database-pisa2006.htm; OECD (2012[13]; 2015[14]), *Survey of Adult Skills (PIAAC) databases*, http://www.oecd.org/skills/piaac/publicdataandanalysis/.

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Box 3.1. Technical note on linking achievement in PISA and PIAAC

Few countries implemented longitudinal follow-ups of PISA participants that include the administration of skills assessments. Canada and Denmark are important exceptions in this respect: in Canada a sample of students participating in the 2000 PISA study was tested again in 2009 using PISA instruments and in Denmark a sample of students participating in the 2000 PISA study was part of the PIAAC study in 2012. Hence, the results presented in this section build on two sources of data: PISA and the Survey of Adult Skills (PIAAC). To examine literacy and numeracy achievement growth between age 15 and young adulthood, analyses are conducted on synthetic cohorts, matching data from PISA and the relevant birth cohort captured in the Survey of Adult Skills (PIAAC). Sample sizes used to construct the synthetic cohorts vary markedly: in PISA, the cohort comprises around 4 500 students per country, compared to only around 150 individuals in the Survey of Adult Skills (PIAAC). For this reason, the PIAAC age band was expanded to include people born one year before and after the relevant PISA cohort. For example, PISA 2000 results are matched to data for 26-28 year-olds surveyed in the Survey of Adult Skills (PIAAC) in 2012 – which, unlike PISA, has been conducted only once so far – for the 17 countries that participated in both. To increase international coverage, data from PISA 2003 were added for three countries that administered the Survey of Adult Skills (PIAAC) in 2015. Similarly, data for PISA 2003 are matched to data for 23-25 year-olds in the Survey of Adult Skills (PIAAC). The supplementary online tables for Chapter 3 present a summary of country-specific sample sizes (see Annex Table 3.A.1).

To identify how achievement growth differs across the two groups, the analyses use evidence on scale concordance provided in Borgonovi et al (2017[10]). No attempts were made to link the Survey of Adult Skills (PIAAC) and PISA at the international level during the design of the two studies. However, in PISA 2012, countries had the opportunity to extend the PISA target population through national options. Scale concordance was estimated using data from Poland, which in 2012 complemented the international PISA sample with a grade-based sample covering a broader age range. As a result, the Polish PISA grade extension included individuals who could have been part of the PIAAC sample. (Borgonovi et al., 2017[10]) used a pseudo-equivalent group approach to achieve pseudo-equivalency between PISA and PIAAC, using propensity score reweighting techniques. All estimates are presented on the PIAAC scale.

This chapter presents estimated differences among high-achieving individuals (90th percentile of the relevant proficiency distribution) and low-achieving individuals (10th percentile of the relevant proficiency distribution), both across the relevant population and across groups defined in terms of parental educational attainment. Box 3.2 and Box 3.3 illustrate findings from longitudinal studies at the individual level on factors that promote successful transitions between age 15 and young adulthood.

Source: Borgonovi et al. (2017[10]), "Youth in transition: How do some of the cohorts participating in PISA fare in PIAAC?", *OECD Education Working Papers*, No? 155, https://dx.doi.org/10.1787/51479ec2-en.

Socio-economic disparities in achievement growth between ages 15 and 27

Figure 3.6 illustrates the patterns in average literacy achievement growth between the ages of 15 and 27. While such growth differed across countries, it could also vary across individuals who come from households with different levels of educational and cultural capital. Such variations could stem, for example, from differences in learning opportunities afforded to various socio-economic groups during the transition from compulsory schooling to further education, training, or the labour market.

Several studies have explored the evolution of disparities in achievement between age 15 and young adulthood in different countries (Borgonovi et al., 2017[10]; Dämmrich and Triventi, 2018[16]), but the lack of psychometric linkages has prevented the study of disparities in achievement growth. This is an important shortcoming.

Differences in parental educational and cultural capital – which influence the informal learning opportunities available to children outside of formal education – could lead to disparities in achievement growth across economic groups. By shaping school selection and parental investment in schooling, they could also determine the formal learning that takes place in schools. Children whose parents hold more advanced formal educational qualifications, and invest in their own lifelong learning, typically achieve at a higher level in school than children whose parents have lower levels of educational attainment. If growth in achievement is positively correlated to previous achievement levels, as detailed in Chapter 1, then the achievement disparities among individuals whose parents have different levels of education are bound to grow cumulatively over time (DiPrete and Eirich, 2006[17]). Access to post-secondary educational opportunities is especially conditional on success in secondary education and, unlike earlier levels of schooling, is not compulsory (Breen and Jonsson, 2005[18]).

However, differences in prior learning are not the only factor that can shape learning trajectories among socio-economic groups. The teenage years and young adulthood in particular are a period of major neurological changes, leading to higher impulsiveness, difficulty in evaluating long-term benefits versus short-term costs and a tendency to engage in risky behaviours. All these changes occur at a time when individuals are taking important educational, training and labour-market decisions which require them to evaluate the costs and benefits of alternative courses of action. Individuals from families with high levels

of educational and cultural capital can generally count on their families to provide strong support, both in terms of resources and advice on how to navigate the increased differentiation of educational and training pathways (Hartung, Porfeli and Vondracek, 2005[19]; Johnson and Leenders, 2001[20]). By contrast, individuals whose parents or guardians have little educational or cultural capital cannot count on their families for advice on how to navigate this important transition.

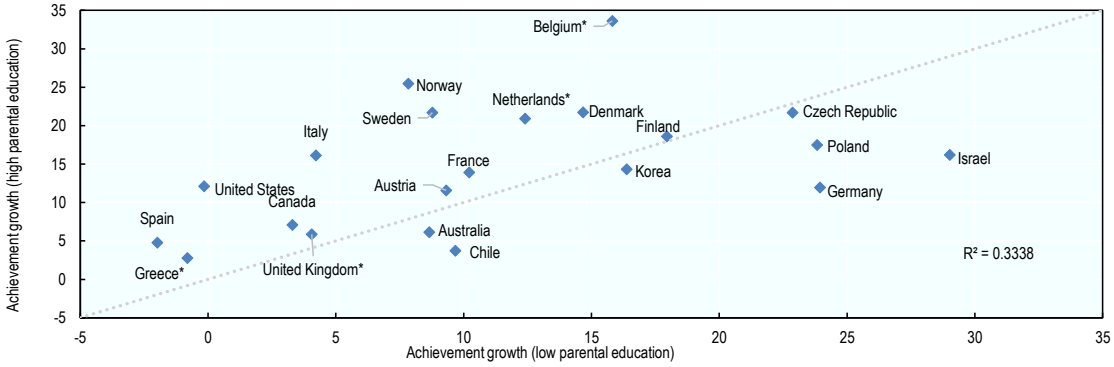
Avoiding downward social mobility is a key driver of the educational choices made by individuals and their families (Breen and Goldthorpe, 1997[21]). Families with high educational and cultural capital are generally willing to invest considerable resources to this end, irrespective of their children's academic potential (Holm, Hjorth-Trolle and Jæger, 2019[22]). Moreover, according to effectively and maximally maintained inequality theories (Holm, Hjorth-Trolle and Jæger, 2019[22]; Raftery and Hout, 1993[23]), even when there exist no quantitative limits on the number of individuals who can enrol in further education and training, there exist qualitative differences in opportunities. Families with high levels of educational and cultural capital seek to secure an educational advantage for their children by ensuring that they participate in more and better tertiary-level education, or engage in learning opportunities that maximise their learning potential.

Figure 3.8 illustrates for each country the level of growth in achievement between age 15 and age 27 among individuals whose parents did not obtain a tertiary degree and those with at least one tertiary-educated parent. On average across OECD countries, the gap in literacy between individuals with at least one tertiary-educated parent and individuals whose parents did not complete a tertiary degree grew by only a small amount, from 19 score points at age 15 (corresponding to 40% of a standard deviation) to 21 score points at age 27 (around 45% of a standard deviation). The evolution of disparities is similar when considering a different measure of socio-economic background and cultural capital, i.e. the number of books in people's homes: the difference in literacy achievement between individuals aged 15-16 with over 100 books at home and individuals with under 100 books at home stood at 27 score points for the cohort of students surveyed in 2000 at age 15, and at 30 score points for the same cohort when tested at age 27 (see the supplementary online tables for Chapter 3 in Annex Table 3.A.1).

Large differences exist in the evolution of disparities in literacy achievement across countries. In Belgium, Norway, Sweden, New Zealand, Italy and the United States, for example, the gap at the population level grew by more than 10 score points, corresponding to an increase of 20% of a standard deviation. Disparities grew because the growth in achievement was especially marked among individuals with tertiary-educated parents, whereas individuals whose parents had not obtained a tertiary degree showed little or no increase in achievement. In Germany and Israel, by contrast, disparities shrank by over 12 points, or 25% of a standard deviation.

At the country level, the size of the socio-economic gap in literacy at age 27 is positively associated with the size of the socio-economic gap in literacy at age 15, but the association is moderate in size (Pearson's $r=0.52$). The majority of countries are in the top triangle of Figure 3.8 meaning that achievement growth was more pronounced among individuals with high parental education than among individuals with low parental education. However, in a few countries, and especially in Israel and Germany, achievement growth was especially marked among individuals with low parental education.

Figure 3.8. Country-level association between disparities in achievement at age 15 and age 27 between individuals with parents with and without tertiary qualifications



Note: Achievement growth refers to the difference in literacy scores between age 27 (comprising 26-28 year-olds for sample-size purposes). The "low parental education" category comprises individuals who reported that neither of their parents had obtained tertiary-level qualifications; the "high parental education" category comprises individuals who reported that at least one of their parents had obtained tertiary-level qualifications. PISA reading scores are expressed in PIAAC literacy scores, following Borgonovi et al., (2017[10]). Box 3.1 describes the methods used.

*For Belgium, Greece, the Netherlands and the United Kingdom, see notes under Figure 3.6.

Source: OECD (2000[11]), *PISA database 2000*, http://www.oecd.org/pisa/data/database-pisa2000.htm; OECD (2012[13]; 2015[14]), *Survey of Adult Skills (PIAAC) databases*, http://www.oecd.org/skills/piaac/publicdataandanalysis/.

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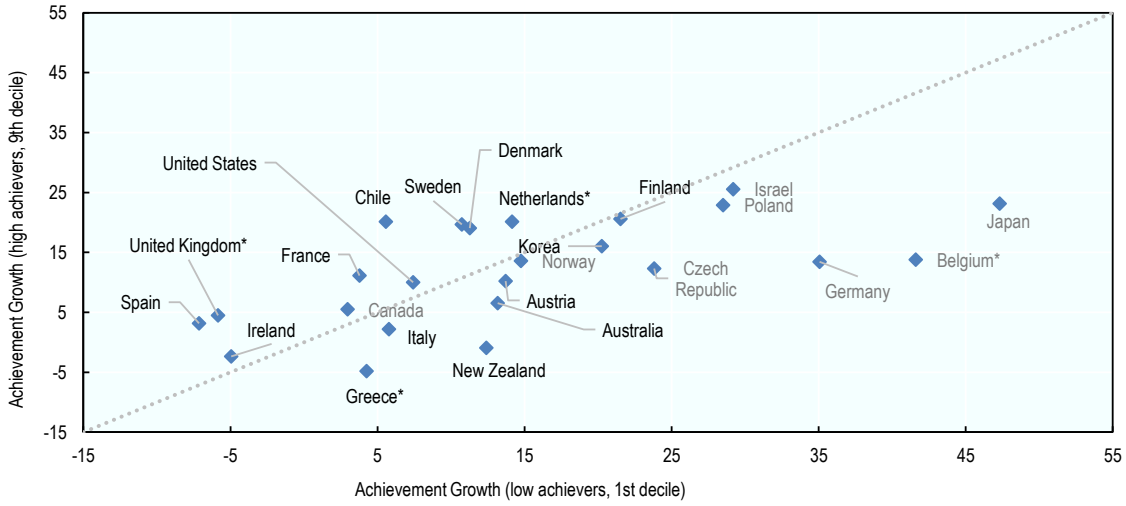
Differences in achievement growth across the performance distribution

Figure 3.6 reports the mean level of achievement on the PISA literacy scale of 15-year-olds tested in PISA in 2000 and individuals from the same birth cohort tested in the Survey of Adult Skills (PIAAC) in 2012 at age 27. The results indicate a literacy achievement score of 207 for the 10% lowest performing 15-year-olds, compared to a score of 222 for the 10% lowest performing 27-year-olds – this represents an increase of 15 score points, equivalent to around 33% of a standard deviation. By contrast, the literacy achievement score of the 10% highest-achieving 15-year-olds was 324, compared to a score of 336 for the 10% highest-achieving 27-year-olds – an increase of 12 points, equivalent to around 25% of a standard deviation. These results suggest that on average, the gap in performance between the highest and lowest achievers narrowed by around 6% of a standard deviation.

The small sample size of available data at the country level does not allow conclusively testing competing hypotheses for divergent findings of narrowing gaps by achievement levels and widening gaps by parental educational attainment. At the international level, however, these results seem driven by the fact that those whose achievement improves the most are low-achieving but high socio-economic status youngsters. Thus, parental investments appear to ensure that youngsters who do not learn at their full potential in formal schooling, and are therefore low achievers at age 15, are able to make the most of formal, informal and non-formal learning opportunities resulting from increased differentiation in learning pathways.

Just as Figure 3.6 illustrates large variability across countries in mean levels of achievement growth, Figure 3.9 identifies large variability across countries in the achievement growth of different groups, although performance disparities declined in most countries as a result of performance increases – especially among the lowest achievers. The marked increase in the performance of the top 10% achievers in countries like Finland, where it was already comparatively high at age 15, suggests that results are not driven by ceiling effects. Given the small sample size at the country level allowing comparisons at the 10th and 90th percentiles of achievement, country level results are generally imprecisely estimated.

Figure 3.9. Literacy achievement growth among low and high achievers between age 15 and age 27, by country



Note: Age 27 refers to 26-28 year-olds for sample-size purposes. High achievers are individuals in the top quarter of the national distribution of literacy achievement at a specific age. Low achievers are individuals in the bottom quarter of the national distribution of literacy achievement at a specific age. Countries are sorted in ascending order of achievement at age 15 among low-achieving individuals. PISA reading scores are expressed in PIAAC literacy scores, following Borgonovi et al. (2017[10]). Box 3.1 describes the methods used. The supplementary online tables for Chapter 3 show the robustness checks and results for numeracy. See Annex Table 3.A.1.
*For Belgium, Greece, the Netherlands and the United Kingdom, see notes under Figure 3.6.
Source: OECD (2000[11]), *PISA database 2000*, http://www.oecd.org/pisa/data/database-pisa2000.htm; OECD (2003[12]), *PISA database 2003*, http://www.oecd.org/pisa/data/database-pisa2003.htm; OECD (2012[13]; 2015[14]), *Survey of Adult Skills (PIAAC) databases* , http://www.oecd.org/skills/piaac/publicdataandanalysis/.

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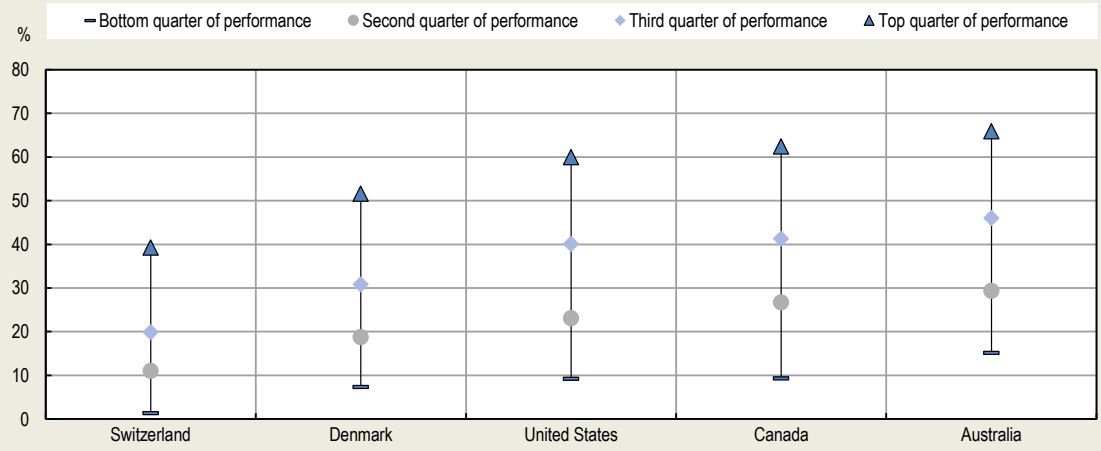
Box 3.2. School-to-work transitions: Evidence from longitudinal data of PISA students

Recent work by the OECD (2018[24]) has used longitudinal data from five countries (Australia, Canada, Denmark, Switzerland and the United States) to examine the relationship between cognitive competencies at age 15, and educational attainment and early labour-market outcomes at age 25. The data sets from Australia, Canada, Denmark, Switzerland and the United States followed the transition into adulthood of early PISA cohorts (2000 and 2003). They have been exploited to shed light on the power of PISA literacy measures to predict adult life outcomes, such as university completion and labour-market prospects. An examination of the relationship between university completion and PISA performance reveals significant differences in achievement across quarters of reading performance in all countries (Figure 3.10).

In Switzerland, only 1% of students in the bottom quarter of reading performance, compared to 39% of students in the top quarter, complete university. In Canada, students in the top quarter of reading performance are 53 percentage points more likely than students in the bottom quarter to earn a university degree. In Australia, Denmark and the United States, differences between these two groups range from 44 to 51 percentage points. The relationship between 15-year-old students' reading performance and completion of a tertiary degree holds across different measures of performance and different fields of tertiary study.

When looking at early career outcomes – and particularly at the percentages of students in skilled employment (defined as a job requiring tertiary education) – by quarters of performance in PISA, the patterns that emerge are similar to the patterns of university completion. In Australia, only 14% of students who were in the bottom quarter of reading performance end up in skilled employment at the age of 25, while nearly 50% of students who were in the top quarter hold a skilled job at that age. In Denmark, students who were in the top quarter of performance at age 15 are 47 percentage points more likely than those in the bottom quarter to hold a skilled job at the age of 25. Differences for the other countries considered in this chapter range from 23 to 25 percentage points.

Figure 3.10. University completion among 25-year-old respondents, by quarter of PISA reading performance



Note: The difference between the top and the bottom quarters of reading performance is statistically significant in all countries. Quarters of performance are computed for the final sample of each country's longitudinal data set. Countries are ranked in ascending order of the percentage of students in the bottom quarter of reading performance.
Source: OECD (2000[11]), *PISA database 2000*, http://www.oecd.org/pisa/data/database-pisa2000.htm; OECD (2003[12]), *PISA database 2003*, http://www.oecd.org/pisa/data/database-pisa2003.htm, Table 5.4; OECD (2018[24]), *Equity in Education: Breaking Down Barriers to Social Mobility*, https://dx.doi.org/10.1787/9789264073234-en.

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Box 3.3. The Danish case: Evidence from a longitudinal study on PISA students

Denmark conducted the 2011-12 Survey of Adult Skills (PIAAC) among a sample of students who had participated in the PISA 2000 assessment. The Survey of Adult Skills (PIAAC) measures adults' proficiency in three key information-processing skills: literacy, numeracy and problem solving in technology-rich environments. Longitudinal follow-ups of PISA students reveal strong links between observable factors at age 15 – including cognitive proficiency and attitudes towards learning – and higher-education and labour-market outcomes.

The findings show that about 30% of the variation in Survey of Adult Skills (PIAAC) literacy and numeracy proficiency scores for 26-year-olds is explained by PISA performance scores in reading and mathematics among 15-year-olds. This indicates that the quality of previous educational opportunities influences how well young adults are equipped to participate in – and benefit from – increasingly knowledge-based societies. The findings also show that earlier education is only one of the factors shaping individuals' ability to process information as adults: attitudes towards schooling and learning developed in adolescence can also explain cognitive development beyond the age of compulsory education. Consistent with the findings detailed in Chapter 2, learning attitudes at age 15 are strong predictors of achievement in young adulthood: around 14% of the total variation in adults' proficiency in numeracy and 12% of the total variation in adult's proficiency in literacy is explained by learning attitudes reported at age 15. In fact, among the learning attitudes considered, students' self-efficacy, enjoyment of reading, and confidence in completing assignments and tests are the strongest predictors of numeracy and literacy proficiency at age 26.

Source: OECD (2018[24]), *Equity in Education: Breaking Down Barriers to Social* Mobility, https://dx.doi.org/10.1787/9789264073234-en.

Smoother transitions: Factors promoting growth in achievement

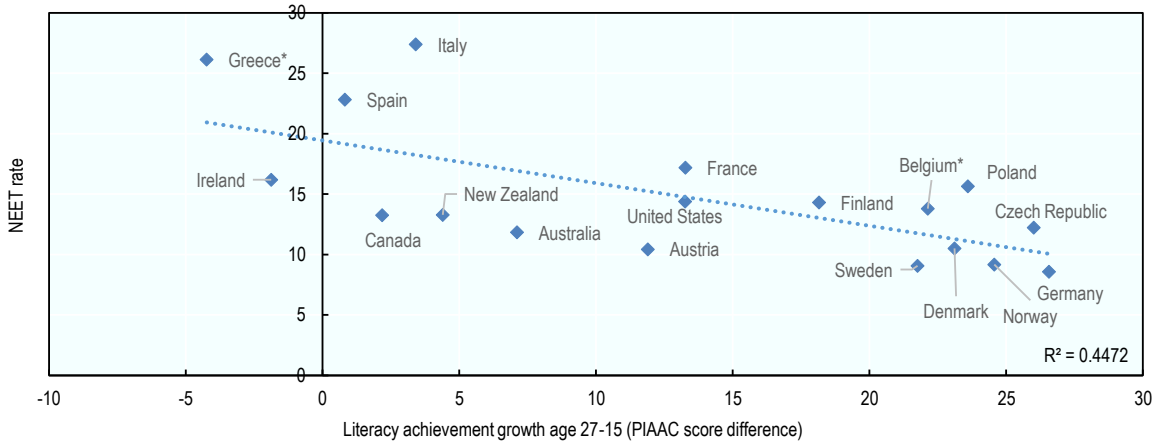
Formal, informal and non-formal learning opportunities

Disparities across countries and across different groups of achievement growth could stem from the opportunities for formal, informal and non-formal learning available to youngsters in each country and group. Such opportunities could arise from participation in post-secondary education or training, or from the use of specific skills in the workplace and everyday life. Individuals who have positive attitudes towards learning and are keen to develop their skills are also more likely to encounter learning opportunities.

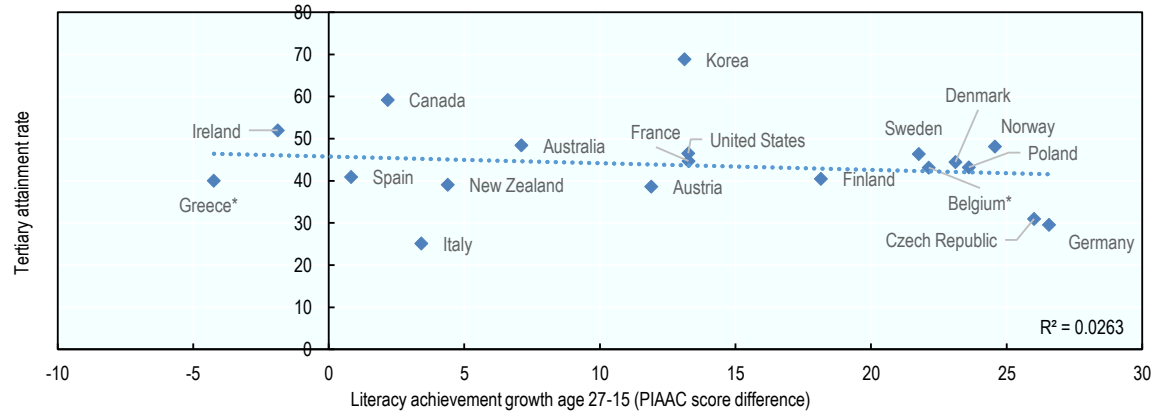
The overall prevalence of NEETs in a country is an important factor explaining the lack of skill development between the end of compulsory schooling and young adulthood, both at the country and individual level. Figure 3.11 shows a mid-size association at the country level between the prevalence of NEETs and average literacy achievement growth, and no association between tertiary attainment rates and literacy growth. In Germany, Sweden and Norway, less than 1 in 10 youngsters was NEET and achievement growth between age 15 and 27 was high. By contrast, in Greece and Italy more than 1 in 4 youngsters was NEET and achievement growth limited.

Figure 3.11. Country-level associations between literacy achievement growth, NEET rates and tertiary attainment rates

Panel A NEET rates



Panel B Tertiary attainment rates



Note: Panel A illustrates the country level association between achievement growth and the percentage of 15-29 year-olds who were not in employment, education or training (NEET) in 2015. Panel B illustrates the country level association between achievement growth and the percentage of 25-34 year-olds in 2015 who had completed a tertiary degree.
*For Belgium and Greece see notes under Figure 3.6.
Source: OECD (2000[11]), *PISA database 2000*, http://www.oecd.org/pisa/data/database-pisa2000.htm; OECD (2003[12]), *PISA database 2003*, http://www.oecd.org/pisa/data/database-pisa2003.htm; OECD (2012[13]; 2015[14]), *Survey of Adult Skills (PIAAC) databases*, http://www.oecd.org/skills/piaac/publicdataandanalysis/; OECD (2020[25]), *Educational attainment and outcomes,* Education at a Glance, OECD.Stat, https://stats.oecd.org/Index.aspx?datasetcode=EDU_ENTR_FIELD.

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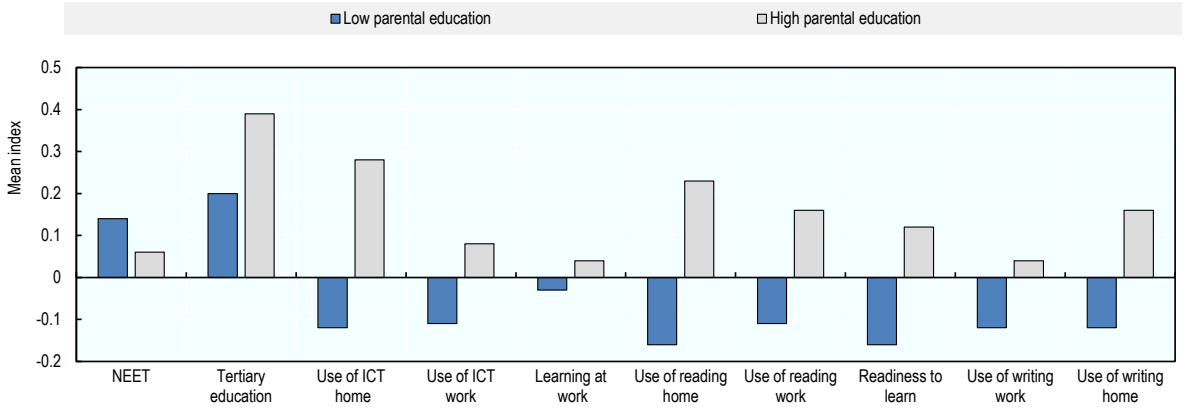
Not all youngsters have opportunities to develop their skills when they leave compulsory schooling. The results presented in Figure 3.12, which are based on 16-28 year-olds surveyed in the Survey of Adult Skills (PIAAC), indicate that individuals with tertiary-educated parents differ from individuals without tertiary-educated parents in key dimensions associated with growth in achievement. First, they are less likely to be classified as NEET. Second, they are more likely to have obtained a tertiary degree; to use reading, writing and information and communications technology (ICT) skills at home and in the workplace; and to engage in learning activities at work. Across OECD countries, for example, 14% of 16-28 year-olds without a tertiary-educated parent were NEET, compared to 6% of 16-28 year-olds with a tertiary-educated parent – a difference of 8 percentage points. By contrast, only 20% of 16-28 year-olds without a

tertiary-educated parent had obtained a tertiary degree, compared to 39% of 16-28 year-olds with a tertiary-educated parent. There also exist large differences in the use of skills at home and at work, and in self-reported readiness to learn and participation in learning activities at work. The differences amounted to 40% of a standard deviation for the use of ICT and reading skills at home.

Figure 3.12. Disparities by parental education in factors that are associated with skill development in young adulthood, OECD average



Note: 16-28 year-olds participating in the Survey of Adult Skills (PIAAC). All differences are statistically significant at the 5% level. NEET rates and rates of individuals engaged in tertiary education are expressed in proportion. All other indicators are expressed in indices standardised to have a mean of 0 across OECD countries and a standard deviation of 1.
Source: OECD (2012[13]; 2015[14]), *Survey of Adult Skills (PIAAC) databases*, http://www.oecd.org/skills/piaac/publicdataandanalysis/.

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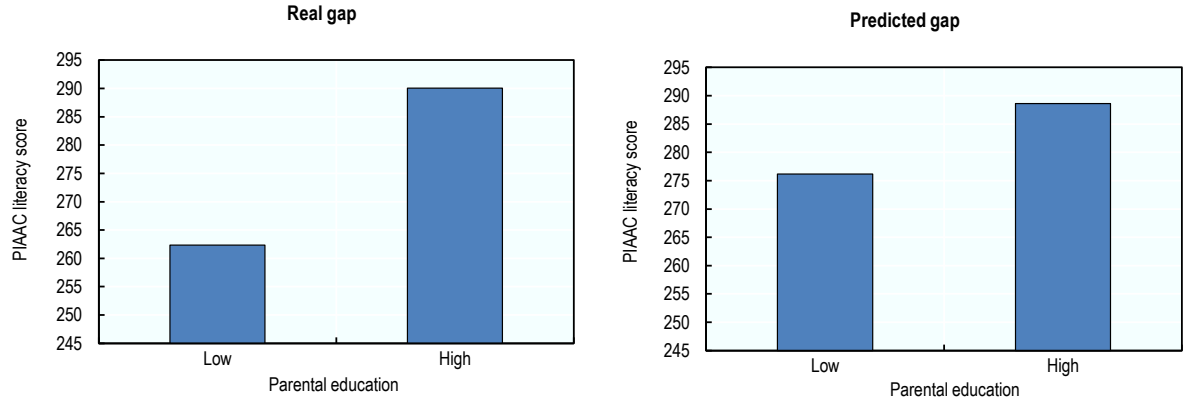
Figure 3.13 suggests that disparities in learning opportunities explain a large share of the differences in literacy achievement among 16-28 year-olds with at least one tertiary-educated parent and those whose parents did not obtain a tertiary qualification. On average across OECD countries, there exists a large difference (28 score points) in literacy achievement between 16-28 year-olds with and without tertiary-educated parents. However, the difference is considerably smaller (12 score points) when accounting for differences in opportunities for formal, informal and non-formal learning. The difference in achievement across the two groups before and after accounting for differences in learning opportunities is sizeable, corresponding to around 30% of a standard deviation in literacy achievement.

Figure 3.13. The role of learning opportunities in explaining disparities in literacy skills among young adults, OECD average



Note: The sample comprises 16-28 year-olds participating in the Survey of Adult Skills (PIAAC). Real gap estimates illustrate the difference in PIAAC literacy scores between individuals with at least one parent with a tertiary-level qualification (high parental education) and individuals with no parent holding a tertiary-level qualification observed in the sample. Predicted gap estimates illustrate the difference in PIAAC literacy scores between individuals with at least one parent with tertiary qualifications (high parental education) and individuals with no parent holding tertiary qualifications among individuals with similar NEET status; similar educational qualifications; similar use of reading, writing and ICT skills at home; and similar levels of readiness to learn. Estimates refer to a pooled linear probability regression model with country fixed effects.
Source: OECD (2012[13]; 2015[14]), *Survey of Adult Skills (PIAAC) databases*, http://www.oecd.org/skills/piaac/publicdataandanalysis/.

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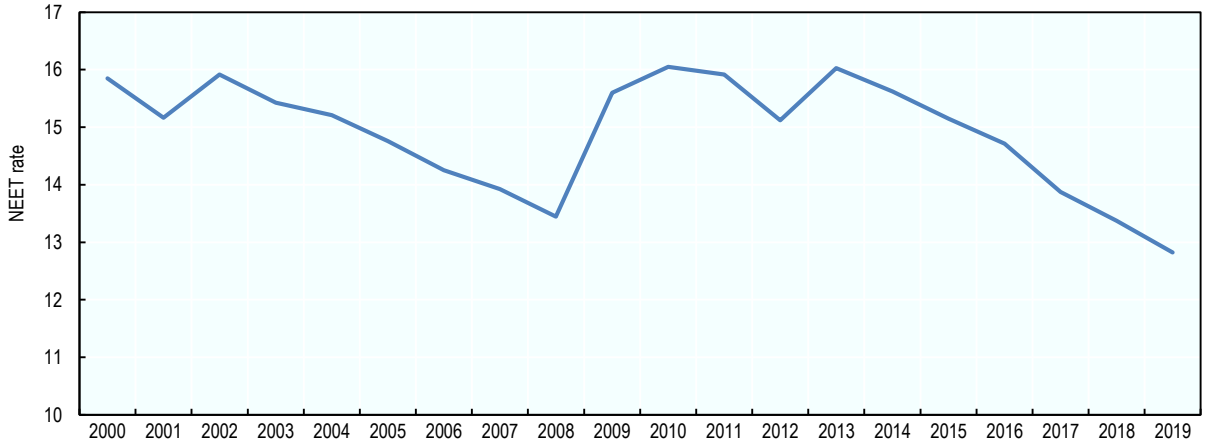
Differences in the prevalence and distribution of learning opportunities explain not only within-country differences in achievement growth across different individuals but also – and crucially – different patterns of achievement growth and inequalities in achievement growth across countries. Countries that offer well-developed and widespread opportunities for skill development display reduced disparities in learning outcomes among youngsters. To facilitate inclusive learning during the transition from compulsory schooling into adulthood, countries should implement policies to minimise the share of NEETs and promote participation in post-secondary training opportunities. They should also create a cultural milieu where individuals routinely use their information-processing skills in the work and everyday activities.

Figure 3.14 suggests that between 2000 and 2019 between 12% and 16% of 15 to 29-year-olds were not in employment, education or training (NEET), thus being at an increased risk of failing to develop their skills through formal education or through learning on the job. The figure also highlights how the progress made in reducing the prevalence of NEETs achieved between 2000 and 2008 was undone by the financial crisis of 2008 and how the NEET rate took a decade to revert to pre-crisis levels. The figure hides important variations across countries: for example the NEET rate was lowest in 2008 in the Netherlands at 5% and highest in Turkey in 2005 at 44%. Although data on the evolution of the NEET rate in the OECD area in 2020 are not yet available, there is a high risk not only that data will reveal a marked increase in the number of youngsters who became NEET as a result of the pandemic, but also that these youngsters will struggle in the years to come as a result of the associated failure in consolidating and building their skills.

Figure 3.14. The evolution of the NEET rate between 2000 and 2019, OECD average

Percentage of 15-29 year-olds not in education, employment or training



Note: The figure illustrates the evolution between 2000 and 2018 in the percentage of 15-29 year-olds who were not in employment, education or training in the respective year.
Source: OECD (2020[25]), *Educational attainment and outcomes,* Education at a Glance, OECD.Stat, https://stats.oecd.org/Index.aspx?datasetcode=EDU_ENTR_FIELD.

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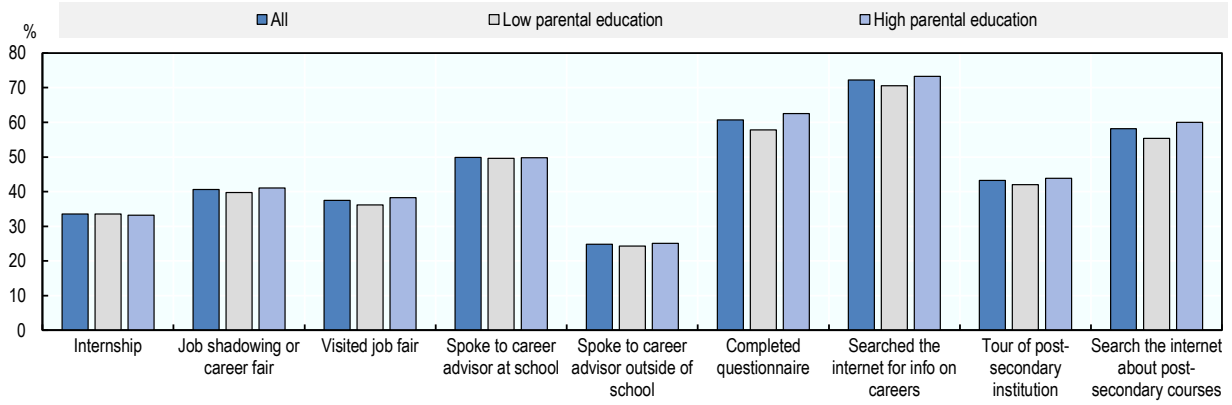
Educational and career orientation

Educational and career guidance and orientation programmes help youngsters develop knowledge and understanding of different occupations. They inform students on the skills and knowledge such occupations require upon entry, as well as the opportunities they offer in terms of career progression. Youngsters discover what working in such occupations entails in terms of financial rewards, opportunities for self-expression, time commitments, travel prospects and work-life balance. Such programmes complement any information youngsters may receive from their family members and immediate social circle, providing additional knowledge and experience that considers broader trends in education and the labour market. Access to high-quality guidance and orientation is increasingly important because of the differentiation in educational and career opportunities, especially within systems that offer little or no flexibility to youngsters who may embark on educational and career paths for which they are ill-suited.

Access to high-quality information on the opportunities to transition from compulsory schooling to further education and the labour market is highly variable, both across countries and across socio-economic groups within countries. Children from socio-economically advantaged households often have parents who possess the skills and knowledge to gather adequate information on alternative pathways and discuss the implications of different educational and career choices. They can also rely on the skills, experience and insights of their parents' social network, which can (formally or informally) help them navigate the transition. By contrast, socio-economically disadvantaged children can rarely rely on a strong support network to help them navigate the transition from compulsory schooling and further education and the labour market (Blustein et al., 2002[26]; Bok, 2010[27]; Smith, 2011[28]). Guidance and orientation programmes are especially important to ensure the success of these youngsters and their families.

Although comparative data on the quality of orientation provided to children near the end of compulsory schooling are absent, 15-year-old students participating in the PISA study in 2018 were asked to describe the activities they pursued to explore future educational and career choices. Figure 3.15 shows few differences by socio-economic condition: children report low participation in face-to-face programmes that involve committing time and resources outside of normal day-to-day schooling, and higher participation in activities such as searching the internet for information on careers and educational opportunities. On average across the 19 OECD countries with available data, 34% of 15-year-old students reported having done an internship; 41% had participated in job shadowing or a worksite visit; 38% had attended a job fair; 50% had spoken to a career advisor at school, and 25% with a career advisor outside of school; 61% had completed a questionnaire to determine their interests and abilities; 72% had searched the internet for information about careers; 43% had gone on an organised tour of an International Standard Classification of Education (ISCED) 3-5 institution; and 58% had searched the internet for information about ISCED 3-5 programmes.

Figure 3.15. Activities undertaken by 15-year-old students to explore future educational and career choices, OECD average



Note: Data represent OECD average results for countries that administered the optional Educational Career Questionnaire. Country-specific results are available in the supplementary online tables for Chapter 3. See Annex Table 3.A.1. "All" refers to the overall student population. "Low parental education" refers to 15-year-old students who reported that neither parent had achieved a tertiary-level qualification. "High parental education" refers to 15-year-old students who reported that at least one parent had achieved a tertiary-level qualification.
Source: OECD (2018[29]), *PISA database 2018*, http://www.oecd.org/pisa/data/2018database/.

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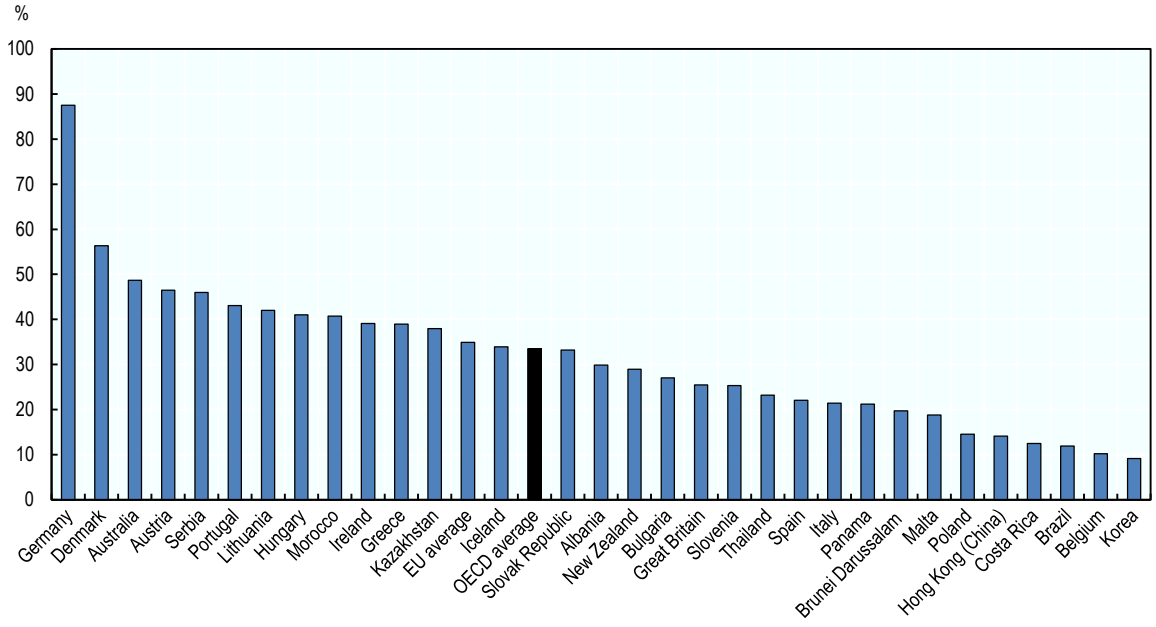
Although Figure 3.15 reveals few differences in the activities 15-year-old students with and without tertiary-educated parents undertake to gather information on educational and career prospects, Figure 3.16 reveals large differences across countries. For example, a full 87% of students in Germany reported participating in an internship, compared to only 9% of students in Korea.

Figure 3.16. Percentage of 15-year-old students who did an internship to explore future educational and career opportunities, by country



Note: Countries are ranked in descending order of the percentage of 15-year-old students who reported performing an internship to explore future educational and career opportunities in 2018. Data are available only for countries that administered the optional PISA Educational Career Questionnaire.
Source: OECD (2018[29]), *PISA database 2018*, http://www.oecd.org/pisa/data/2018database/.

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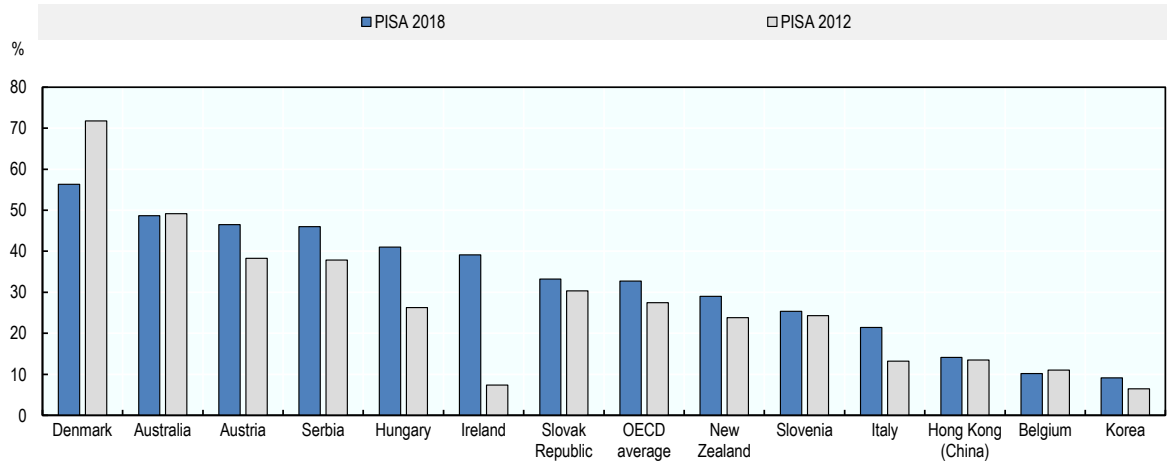
Students seem especially interested in internships, which represent an opportunity to experience first-hand the demands of working life. Figure 3.17 indicates that participation in internships increased by 5% points on average between 2012 and 2018 in the 13 countries and economies that administered questions on participation in orientation programmes. In 2012, 27% of 15-year-old students reported having participated in an internship, compared to 33% by 2018. However, in Denmark – the country with the largest participation (72%) in 2012 – participation declined by 15 percentage points (56%) in 2018.

Figure 3.17. Percentage of 15-year-old students in 2012 and 2018 who performed an internship to explore future educational and career opportunities, by country



Note: Countries are sorted in descending order of the percentage of 15-year-old students who reported participating in an internship to explore future educational and career opportunities in 2018. Only countries with available data on both 2012 and 2018 are featured.
Source: OECD (2012[30]), *PISA database 2012*, http://www.oecd.org/pisa/data/pisa2012database-downloadabledata.htm; OECD (2018[29]), *PISA database 2018*, http://www.oecd.org/pisa/data/2018database/.

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Box 3.4. The role of internships

The workplace is a powerful learning environment where students can acquire technical skills from expert practitioners using real-life equipment, as well as key soft skills like teamwork and communication. School-mediated workplace learning offers students the opportunity to transition from school to work and provides employers with a means of recruitment. Student employment eases the transition into employment (Musset, 2019[31]): data from Eurostat identify a strong link between student participation in work-based learning and employment outcomes up to the age of 34. Student participation in both mandatory and optional upper-secondary and post-secondary (non-tertiary) placements is associated with greater likelihood of adult employment. Evidence of more positive outcomes was found regardless of whether the associated programme of full-time study covered vocational or general education. Empirical research also identifies a positive association between teenagers' participation in part-time employment and their readiness to join the adult labour market (Patton and Smith, 2010[32]). Part-time work is believed to encourage reflection and increase thoughtfulness in career planning and exploration (Creed and Patton, 2003[33]). Several studies identify an important scope for schools to draw on young people's first-hand knowledge of the labour market through part-time work performed within the framework of career-education programmes (Greene and Staff, 2012[34]), like the successful Finnish School to Work Group Method preparatory programmes assessed by (Koivisto, Vuori and Vinokur, 2010[35]). Yet schools have historically failed to draw on such opportunities to encourage critical reflection and career exploration among their students.

Longitudinal analyses of the long-term impacts of part-time employment tend to highlight greater financial returns in relation to steady employment over a longer duration (Light, 1999[36]; Staff and Mortimer, 2008[37]). Such findings may help explain why US summer job programmes consistently fail to correlate with long-term economic benefits: they are too brief. However, exceedingly long working hours that end up significantly damaging academic prospects should clearly be avoided. Students working such long hours can be seen as having at least one foot already in the labour market, with short-term gains in smoothing the transition to adult employment potentially leading to longer-term losses linked to weaker academic credentials.

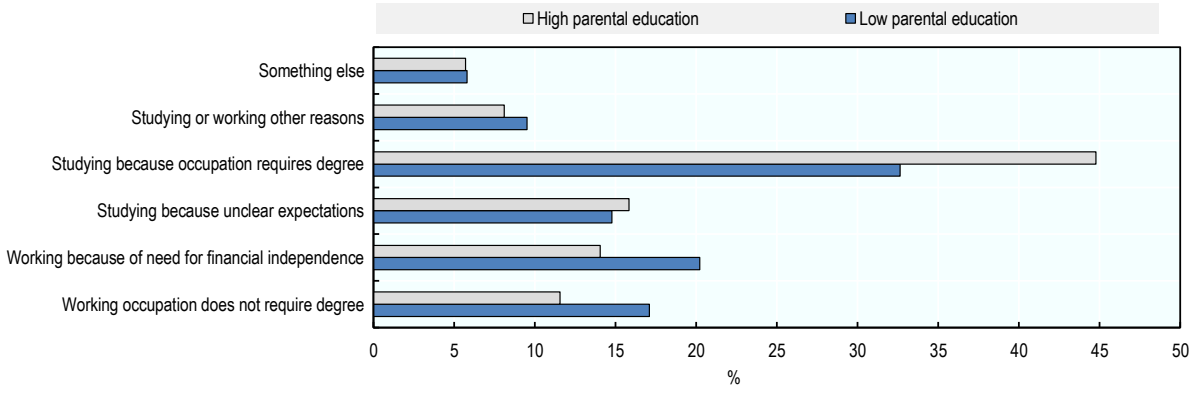
Depending on their socio-economic background, students have vastly different expectations for work and study. Socio-economically disadvantaged students are more likely to expect to be working rather than studying at age 20, partly because they need to be financially independent and partly because their intended occupation does not require a diploma or university degree. By contrast, socio-economically advantaged students are more likely to expect to be studying at age 20, because their intended occupation requires tertiary qualifications. Figure 3.18 indicates that on average across OECD countries with available data, 17% of 15-year-old students whose parents did not obtain a tertiary-level degree reported they expected to be working rather than studying at age 20 because their preferred occupation did not require a study degree. By contrast, only 12% of 15-year-olds with at least one tertiary-educated parent expected to be working.

Differences in expectations are only partially explained by differences in achievement among socio-economically advantaged and disadvantaged groups (see the supplementary online tables for Chapter 3 in Annex Table 3.A.1): while 33% of students without a tertiary-educated parent expected to be studying because their intended occupation requires a degree, 45% of 15-year-olds with at least one tertiary-educated parent also expected to be studying.

Figure 3.18 indicates that financial considerations weigh more heavily on socio-economically disadvantaged students: 20% of 15-year-olds without a tertiary-educated parent said they expected to be working at age 20 because they need to be financially independent, compared to only 14% of 15-year-olds with a tertiary-educated parent.

In recent years, the OECD and other research organisations have devoted considerable energy to understanding good practice in the organisation and delivery of guidance and orientation programmes. Best practices include starting early, when youngsters are still in school, and ensuring that guidance is delivered by trained professionals. The aim is to give learners agency and access to learning or labour-market opportunities that will allow them to realise their long-term life objectives. Consideration should be given not only to individuals' academic strengths and preferences, but also to present and future labour-market needs. Guidance and orientation should refrain from reinforcing stereotypes, ensuring that irrespective of gender, socio-economic condition and migrant status, individuals can embark on lifelong learning with the aim of leading economically active and socially engaged lives.

Figure 3.18. Disparities in medium-term work and study plans, OECD average



Note: Estimates refer to the OECD average among countries that administered the Educational Careers Questionnaire. Country-specific results are available in the supplementary online tables for Chapter 3. See Annex Table 3.A.1. "High parental education" refers to 15-year-olds who reported that at least one of their parents had a tertiary qualification. "Low parental education" refers to 15-year-olds who reported that neither parent had a tertiary qualification.
Source: OECD (2018[29]), *PISA database 2018*, http://www.oecd.org/pisa/data/2018database/.

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The role of expectations

Educational and career guidance is all the more important given the rapid technological and social transformations underway. In the past, youngsters were inspired by their parents and immediate social circles to evaluate the appeal of different professions. However, many of the occupations that exist today will have changed profoundly by the time today's youth enter the labour market. Chapter 5 details the rising number of workers who will need to undergo upskilling or reskilling to find employment in new and growing sectors, since their current jobs may disappear as a result of technological innovations and automation. However, changing sectors and reskilling is harder than seeking work in occupations where human work is complemented by technological innovations, rather than replaced by new technologies. This section examines to what extent youngsters who are about to complete compulsory schooling expect to work in occupations that are projected to shrink in the future, providing an indication of those areas where 15-year-olds may especially require guidance and orientation.

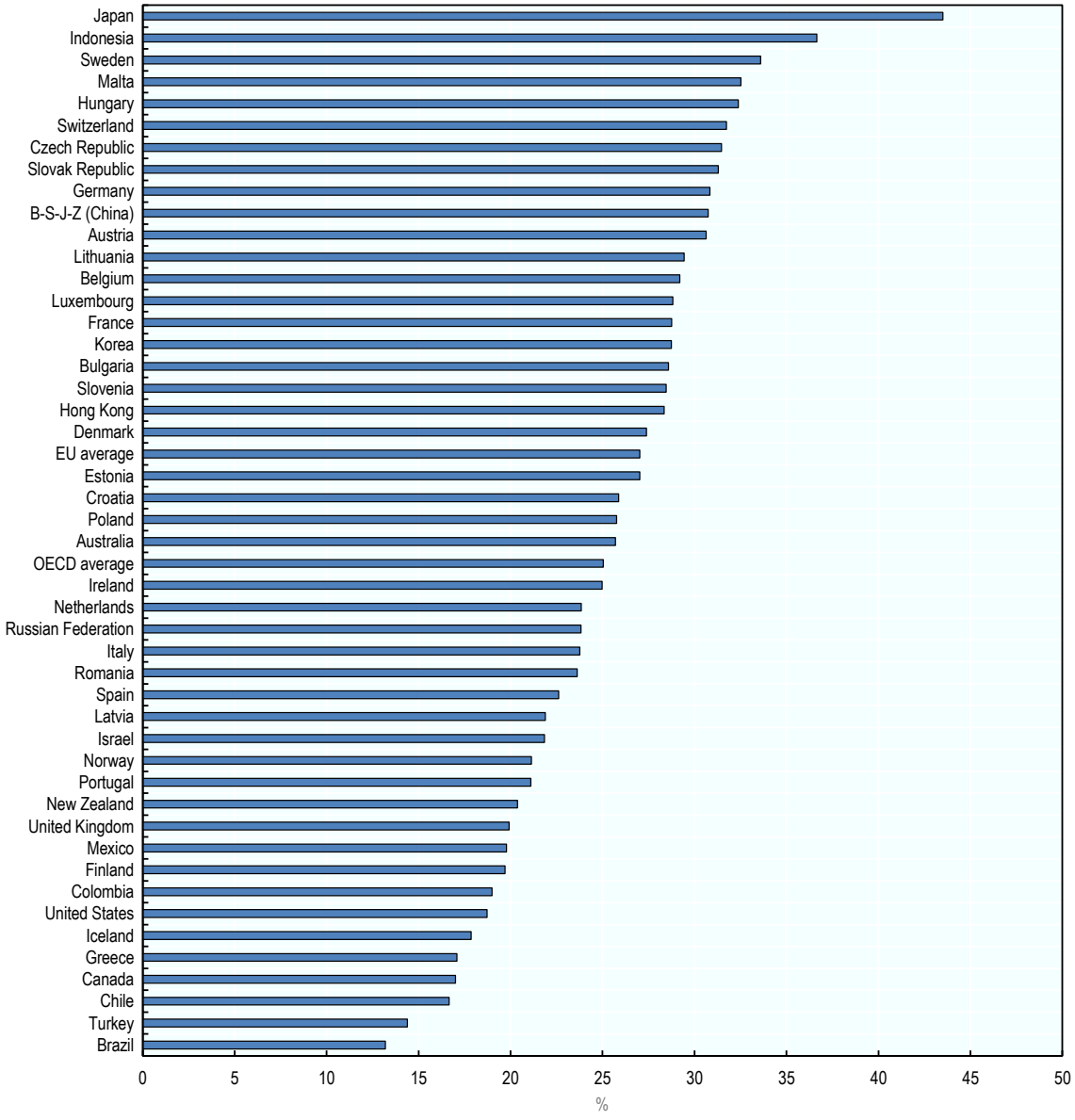
In the absence of country-specific projections on the jobs that will grow or shrink in the near future, projected changes in labour demand in the United States are used to define growing and shrinking occupations. The trajectory of industrial and occupational evolutions in the United States are also observed in other countries, including in Europe (Goos, Manning and Salomons, 2009[38]). In fact, technological advances are a relatively global phenomenon, affecting the employment structure of countries at different levels of economic development (Conte and Vivarelli, 2011[39]; Rodrik, 2018[40]). The interpretation of the results should nonetheless be considered with caution. In some countries, patterns will be similar to those observed in the United States. In others – particularly those at the frontier of technological adoptions, such as Korea or Japan (OECD, 2020[41]) – projections based on evidence from the United States may understate the expected changes. In yet other countries, particularly those lagging behind the United States in technology adoption, results may overstate the pace of change.

Moreover, the projection also reflects demographic changes in the United States, which might not be aligned with demographic changes in other countries. For instance, the estimated growth of service

occupations associated with population ageing in the United States may be less marked than in countries experiencing faster population ageing, such as Germany, Italy and Japan. Finally, the projection's methodology considers both the demand and supply sides of the labour market. Therefore, the expected impact of policies must also be considered in a general framework, since the projection itself changes in response to policy interventions. For instance, if a country promotes the participation of women in occupations that are expected to experience shortages in skilled labour, that policy will also have a feedback effect on other occupations, such as household support and childcare.

Figure 3.19 illustrates the percentage of 15-year-old students who indicate they expect to work in an occupation that is projected to shrink between 2019 and 2029. The match is based on students' reports on the job they expect to hold at age 30 and linked to projections from the U.S. Bureau of Labor Statistics. On average across OECD countries, 25% of 15-year-old students in 2018 expected to work in occupations that are projected to shrink between 2019 and 2029. Among OECD countries, Japan had the largest proportion (43%) of 15-year-old students who expect to work in occupations with declining employment prospects, compared to over 20% of 15-year-old students in Korea, Hungary, the Czech Republic, the Slovak Republic and Austria. Turkey, Colombia and Chile had the smallest share of students who expected to work in a shrinking occupation.

Figure 3.19. Percentage of 15-year-old students who expect to work in an occupation projected to decline between 2019 and 2029, by country



Note: A shrinking occupation is defined as 4-digit occupations at the bottom quartile of the projected change in employment share between 2019 and 2029. Employment projection comes from the U.S. Bureau of Labor Statistics and is based on the United States. Employment share change was calculated after converting the occupational classification into ISCO-08 (from OES2019 via SOC2010), using the crosswalk tables provided by the U.S. Bureau of Labor Statistics. BS-JZ (China): Beijing, Shanghai, Jiangsu and Zhejiang (China).
Source: OECD (2018[29]), *PISA database 2018*, http://www.oecd.org/pisa/data/2018database/.

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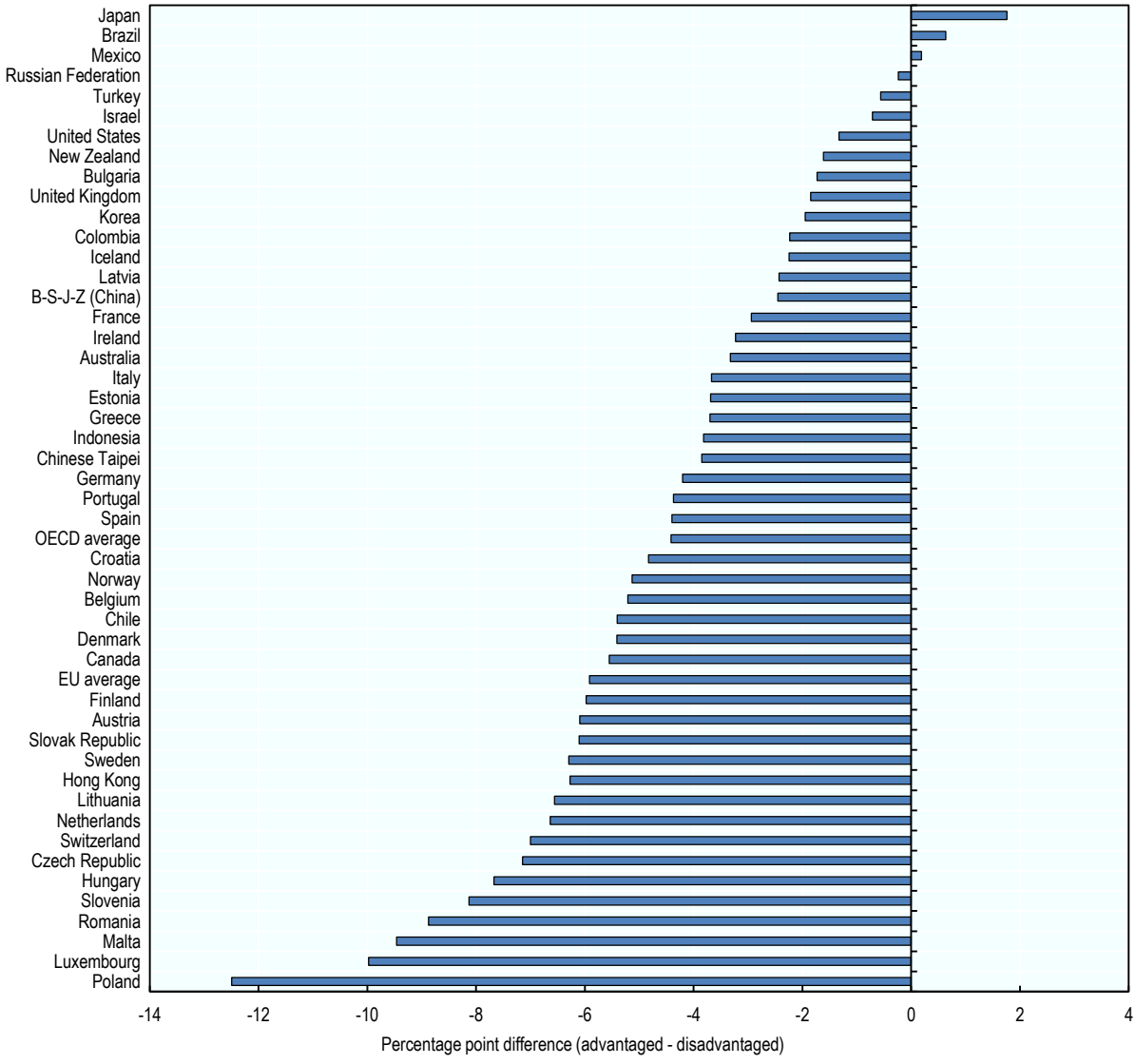
Not all students have equal expectations concerning their future occupation: in many countries, male students and students without a tertiary-educated parent are more likely to expect to work in a shrinking occupation than female students and students with at least one tertiary-educated parent. On average across OECD countries, 27% of male 15-year-old students in 2018 expected to work in an occupation

projected to shrink over 2019-29 compared to 23% of female 15-year-old students, a difference of 4 percentage points. Gender differences are the largest in the Czech Republic, the Slovak Republic and Ukraine, where the gender gap is greater than 10 percentage points. By contrast, female students in Latvia are more likely to expect to work in occupations that are expected to shrink, and the gender gap is large (10 percentage points) (data available in the supplementary online tables for Chapter 3 in Annex Table 3.A.1).

Figure 3.20. Socio-economic differences in the percentage of 15-year-old students who expect to work in a shrinking occupation, by country



Note: A shrinking occupation is defined as 4-digit occupations at the bottom quartile of the projected change in employment share between 2019 and 2029. Employment projection comes from the U.S. Bureau of Labor Statistics and is based on the United States. Employment share change was calculated after converting the occupational classification into ISCO-08 (from OES2019 via SOC2010), using the crosswalk tables provided by the U.S. Bureau of Labor Statistics. BS-JZ (China): Beijing, Shanghai, Jiangsu and Zhejiang (China).
Source: OECD (2018[29]), *PISA database 2018*, http://www.oecd.org/pisa/data/2018database/.

StatLink https://stat.link/ifq0dj

The results presented in Figure 3.20 suggest that socio-economically disadvantaged 15-year-old students are generally more likely than socio-economically advantaged 15-year-old students to expect to work in occupations that are projected to shrink between 2019 and 2029. On average across OECD countries in 2018, 27% of students whose parents had low levels of educational attainment and 23% of students with at least one tertiary-educated parent expected to work in shrinking occupations by age 30, a difference of 4 percentage points. Socio-economic differences were most pronounced in Austria, Switzerland, the Czech Republic, Norway, Germany, Indonesia, Slovenia and Thailand, amounting to at least 5 percentage points.

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Annex 3.A. Supplementary tables

Annex Table 3.A.1. List of online tables for Chapter 3

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