



Do boys and girls differ in their attitudes towards school and learning?

This chapter discusses differences in boys' and girls' behaviour and attitudes. It examines how teenagers spend their time outside of school, notably regarding reading and the use of digital devices. It then explores gender differences in self-regulation and attitudes towards learning, such as competitiveness. The chapter also focuses on gender gaps in the expectation of pursuing a science-related career.

8 Do boys and girls differ in their attitudes towards school and learning?

Results from previous PISA cycles consistently show the pervasive over-representation of boys amongst low achievers in reading (see Chapter 7). Evidence suggests that women are more likely than men to graduate from tertiary education and less likely to leave school early (OECD, 2015_[1]). However, while in most countries women attain higher levels of education than men, on average, they are less likely than men to be employed and they earn less, even when they have attained the same level of education (OECD, 2017_[2]). In most countries/economies, girls usually outperform boys academically; but women are less likely than men to choose the pathways through education and fields of studies that lead to the highest-paid professions, such as science, mathematics or computing (OECD, 2017_[2]; OECD, 2018_[3]). This can have negative consequences for women's labour market prospects (Machin and Puhani, 2003_[4]; OECD, 2015_[1]).

In many places, boys and girls are often raised differently, based on two distinct models of socialisation. This may affect the types of activities they favour, with potential impact on achievement at school (Hadjar et al., 2014_[5]), the types of skills they acquire and develop, and what they expect for their future – all of which, in turn, reinforce gender stereotypes and disparities in labour market outcomes.

Motivation and self-confidence can affect students' quality of life during their adolescence and may influence whether they pursue further education or work later on. For example, women's relative lack of self-confidence, compared to men, and their relative discomfort with competition may explain the pervasive gender gap in wages and in the under-representation of women in high-wage positions (Lackner, 2016_[6]).¹ Closing the gender gaps in both achievement at school and in the labour market requires identifying the factors that shape students' motivation and aspirations.

Previous analyses show that gender gaps in both performance and the aspirations of young people vary substantially across countries, and that in some countries these gaps have narrowed over the decades (OECD, 2015_[1]; Stoet and Geary, 2018_[7]). This suggests that social factors play a large role in explaining these differences between boys and girls. Parents' and teachers' support of and interest in their students, and school policies and practices, may help shape students' behaviour and dispositions towards learning; students' behaviour and dispositions, in turn, may affect the type and degree of support that parents and teacher provide. Such support can thus go a long way towards addressing the underperformance of boys at school and reducing bias, based on gender stereotypes, in girls' choice of further education and careers.

What the data tell us

- In all countries and economies, girls reported much greater enjoyment of reading than boys. The largest gender gap in enjoyment of reading was observed in Germany, Hungary and Italy and the smallest in Indonesia and Korea. On average across OECD countries in 2018, both boys and girls reported significantly less enjoyment of reading than their counterparts did in 2009.
- In the majority of countries and economies that participated in PISA 2018, boys were more likely to express more positive attitudes towards competition than girls, with the largest gender differences observed in France, Portugal, the United Kingdom and Uruguay. However, in Albania, Brunei Darussalam, Georgia, Indonesia, Jordan, Malaysia, Morocco, Qatar, Saudi Arabia and the United Arab Emirates, girls reported significantly more positive attitudes towards competition than boys; and in Bulgaria, Japan and Kazakhstan, both girls and boys had predominantly negative, and similar, attitudes towards competition.
- In 2018, on average across OECD countries, only 1% of girls reported that they want to work in ICT-related occupations, compared with 8% of boys who so reported. In some countries, including Bulgaria, Estonia, Lithuania, Poland, Serbia and Ukraine, more than 15% of boys reported that they expect to work in an ICT-related profession; but in no PISA-participating country or economy did more than 3% of girls so report.
- On average across OECD countries, only 14% of girls who were top performers in science or mathematics reported that they expect to work as professionals in science or engineering compared with 26% of top-performing boys who so reported. However, in several countries, including Estonia, Finland, Poland and Slovenia, top-performing boys and girls were equally likely to report that they expect to work in such occupations.

READING, GAMING AND CHATTING: HOW BOYS AND GIRLS SPEND THEIR LEISURE TIME IN THE AGE OF SOCIAL MEDIA

Reading for enjoyment

Previous evidence suggests that the association between academic performance and enjoyment of reading is strong (OECD, 2010^[8]; Mol and Jolles, 2014^[9]; OECD, 2015^[1]; Guthrie, Schafer and Huang, 2001^[10]), and that the influence runs in both directions (Mol and Bus, 2011^[11]).² Students who enjoy reading, and make it a regular part of their lives, are able to improve their reading skills through practice. Better readers tend to read more because they are more motivated to read, which, in turn, leads to improved vocabulary and comprehension skills (Sullivan and Brown, 2015^[12]).

As in previous cycles of PISA, the contextual questionnaire distributed in PISA 2018 allowed for measuring the proportion of students who read for enjoyment. It asked students whether they agree (“strongly disagree”, “disagree”, “agree”, “strongly agree”) with several statements about their attitudes towards reading, including “I only read if I have to”; “Reading is one of my favourite hobbies”; and “I read only to get information that I need.” Students’ responses to these questions were summarised in an index of enjoyment of reading. The index is standardised to have a mean of 0 and a standard deviation of 1 across OECD countries.

In all PISA-participating countries and economies in 2018, girls reported much higher levels of enjoyment of reading than boys (Figure II.8.1). On average across OECD countries, the difference in reading enjoyment between boys and girls was larger than half a standard deviation, even after accounting for students’ reading performance. The largest gender gap in enjoyment of reading was observed in Germany, Hungary and Italy, where it was larger than 0.8 of a standard deviation. The smallest gender gaps were observed in Indonesia and Korea, where the difference between girls and boys corresponded “only” to 0.2 of a standard deviation.

On average across OECD countries, 24% of 15-year-old boys and 44% of girls the same age agreed that “Reading is one of my favourite hobbies”, while 60% of boys but 39% of girls agreed that “I read only to get information that I need”. In 2009, on average across OECD countries, a similar proportion of girls, and a slightly smaller proportion of boys, agreed that “reading is one of my favourite hobbies”. But compared with 2009 results, in 2018 larger proportions of both boys (an increase of 7 percentage points) and girls (an increase of 9 percentage points) agreed that “I read only if I have to”.

When asked how much time they usually spend reading for enjoyment, more than 75% of boys reported either none at all or less than 30 minutes a day, on average across OECD countries; less than 3% reported that they read more than two hours a day. By contrast, 43% of girls reported that they read at least 30 minutes a day, and 8% of them reported reading more than 2 hours a day.

Previous PISA assessments show that, in the majority of OECD countries, the share of 15-year-old students who reported that they read for enjoyment shrank between 2000 and 2009 (OECD, 2010^[13]). That trend continued over the following decade. On average across OECD countries, the index of enjoyment of reading decreased significantly amongst both boys (by 0.05 of a standard deviation) and girls (by 0.1 of a standard deviation) (Table II.B1.8.5). In 15 countries and economies, both boys and girls reported significantly less enjoyment of reading. The most dramatic declines in enjoyment of reading between 2009 and 2018 were observed in Finland, Germany and Sweden, where the index of enjoyment of reading shrank by 0.4 of a standard deviation for girls – and by 0.2 to 0.3 of a standard deviation for boys.

However, in 15 countries in 2018, both boys and girls reported greater enjoyment of reading than their counterparts did in 2009. The largest increases were observed in Bulgaria, Colombia, Costa Rica, the Russian Federation (hereafter “Russia”) and Uruguay, where the index of enjoyment of reading rose by at least 0.2 of a standard deviation amongst both boys and girls. This trend in enjoyment of reading may be also related to a change in what students are reading. In this age of digital media, students may be reading fewer books, magazines and newspapers, but they may be reading more on line – whether “chats” with their friends, articles on online news sites, or websites offering practical information; see *PISA 2018 Results [Volume I], What Students Know and Can Do* (OECD, 2019^[14]).

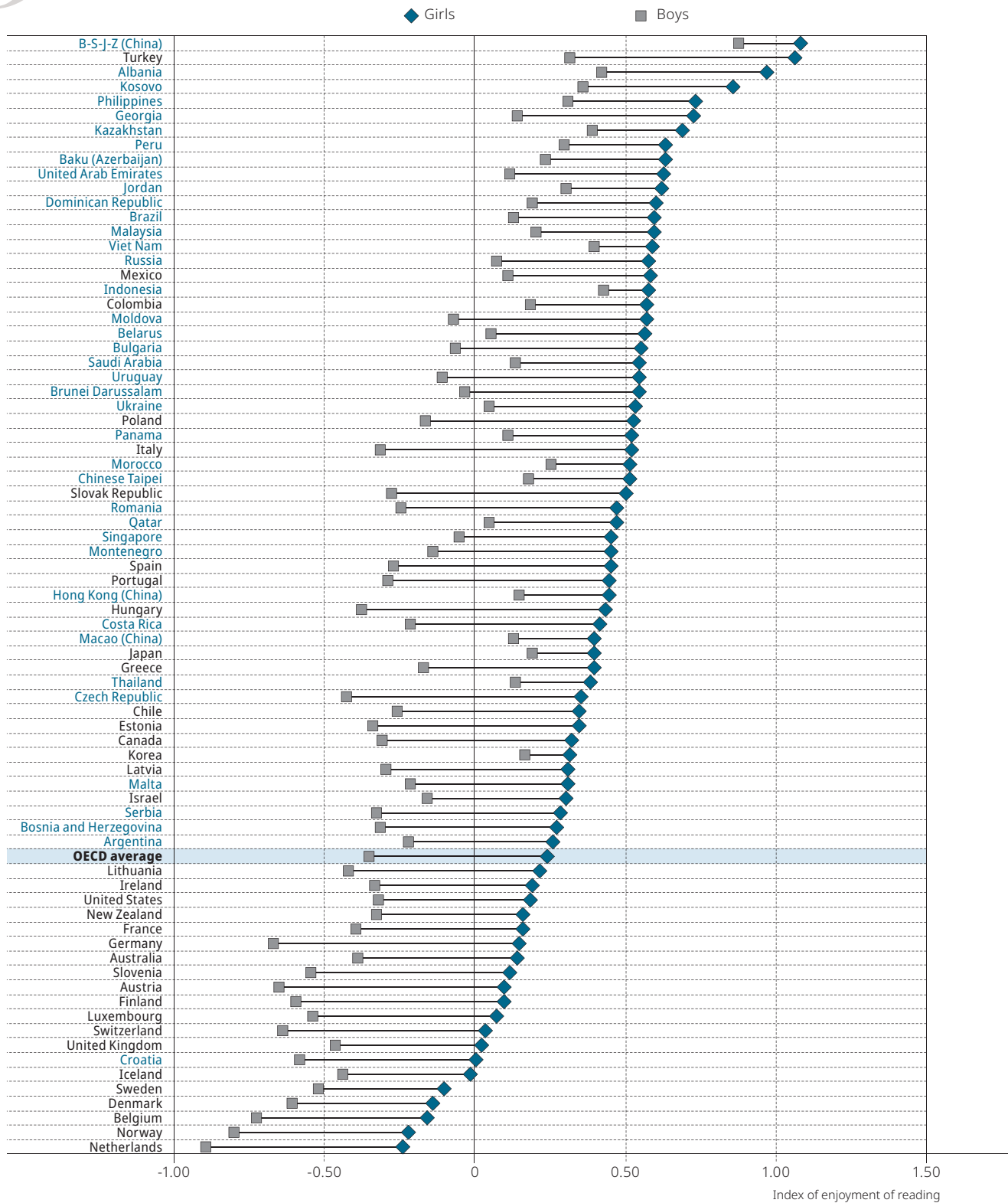
Use of digital devices

The 15-year-olds who were assessed in the most recent cycle of PISA were raised in an environment of rapid technological advances and increasing reliance on digital devices. Being “connected” is an integral part of their lives. It provides an avenue for entertainment and a way of communicating with their peers anytime, anywhere.

The Internet has become an everyday tool for most 15-year-old students. Most digital devices are connected to the Internet and so provide access to web-based services, such as social networking sites, cloud computing services and video games. Many of these services support formal and informal learning, provide information on almost anything, offer entertainment, and help maintain connections with friends, family and teachers. In 2018, almost every student in most OECD countries reported that they had a link to the Internet at home; see *PISA 2018 Results [Volume I], What Students Know and Can Do* (OECD, 2019^[14]).

Do boys and girls differ in their attitudes towards school and learning?

Figure II.8.1 Gender gap in enjoyment of reading



Note: All differences between girls and boys are statistically significant (see Annex A3).
 Countries and economies are ranked in descending order of the mean index of enjoyment of reading amongst girls.
Source: OECD, PISA 2018 Database, Table II.B1.8.1.
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With children having greater access, and at ever-younger ages, to smartphones, teenagers' online activities are increasingly unsupervised. This has raised concern amongst parents and teachers. For instance, previous results from PISA suggest that students who use the Internet intensively (more than six hours a day) perform worse academically, particularly when they use the Internet intensively on school days (Echazarra, 2018_[15]); and extreme Internet users often report less well-being; see Chapter 13 of *PISA 2018 Results (Volume III): What School Life means for Students' Lives* (OECD, 2019_[16]).

But intensive use of the Internet may be a symptom, rather than a cause, of poor school performance or social unease (Spada, 2014_[17]; Brunet et al., 2014_[18]; Marchant et al., 2017_[19]). Using these technologies also gives teenagers an opportunity to acquire essential skills. The types of information literacy required both at work and in social interactions have changed profoundly with digitalisation, and adolescents must be equipped with the skills needed to thrive in knowledge economies.

To better understand students' use of the Internet, an optional ICT familiarity questionnaire was distributed in 53 countries and economies that participated in PISA 2018. It included questions about how teenagers use digital devices. Specifically, 15-year-old students were asked to report how frequently (“never or hardly ever”, “once or twice a month”, “once or twice a week”, “every day”) they use digital devices for specific activities, such as playing games, chatting on line, reading news on the Internet (e.g. current affairs) or obtaining practical information from the Internet (e.g. locations, dates of events, etc.). Students' answers to these questions were summarised in an index measuring the frequency of ICT use outside of school for leisure. The index was standardised to have a mean of 0 and a standard deviation of 1 across OECD countries.

In all countries where the optional ICT questionnaire was distributed in PISA 2018, boys reported greater frequency of ICT use outside of school for leisure than girls (Table II.B1.8.6). In almost all countries, except the Dominican Republic, Iceland, Israel, Japan, Korea, Mexico, Morocco, Panama and Slovenia, the index was positive for boys, meaning that they reported greater frequency of ICT use during their leisure time than the OECD average. By contrast, girls usually reported less-frequent use of digital devices outside of school than the OECD average – except in Bulgaria, Greece, Hong Kong (China), Italy, Lithuania, Macao (China), Malta, Russia, Serbia and Thailand.

Girls and boys also differed in what they use digital devices for (Figure II.8.2). On average across OECD countries, the proportion of girls who reported using digital devices every day or almost every day for participating in social media was larger – by 10 percentage points – than that of boys; and girls were slightly more likely than boys (a difference of 4 percentage points) to report using these devices frequently for chatting on line. But the largest gender gap regarding ICT activities concerned video games. For teenagers in 2018, the “gaming divide” was wide. On average across OECD countries, 53% of 15-year-old boys, but only 10% of girls that age reported that they play collaborative online games every day or almost every day; and 28% of boys, but 14% of girls reported that they play online games via social networks.

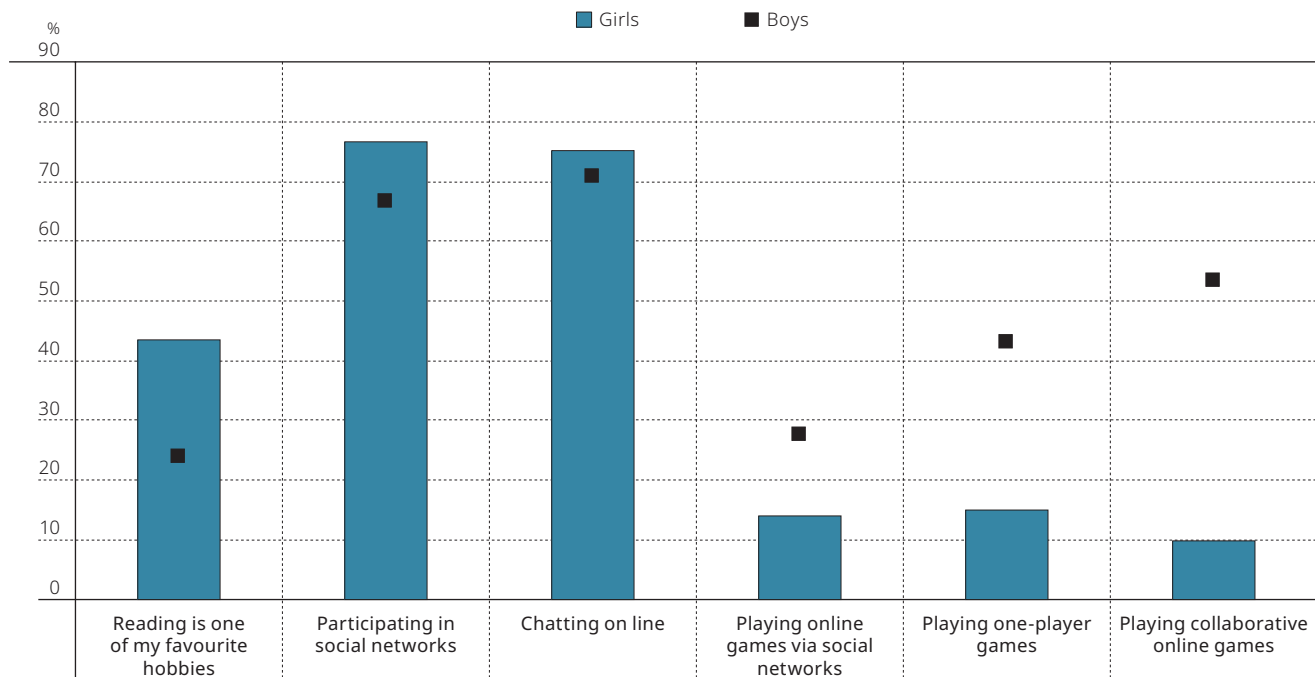
The impact of videogaming on academic performance is a hotly debated topic, and recent large meta-analyses suggest that the influences of videogaming, itself, on mental health and academic performance are weak (Ferguson, 2015_[20]). However, previous evidence from PISA finds a negative relationship between intensive, online collaborative videogaming and academic performance (OECD, 2015_[11]) – similar to spending too much time on the Internet during school days (Echazarra, 2018_[15]). Recent research shows that too much time spent in front of a screen, especially before bedtime, may reduce sleep duration and quality, with potentially negative effects on health and cognitive performance (Billari, Giuntella and Stella, 2018_[21]; Parent, Sanders and Forehand, 2016_[22]). Yet different intensity in the use of ICT devices does not explain the gender differences in attitudes towards reading. The magnitude of the gender gap in enjoyment of reading appears similar, even when one compares boys and girls who use ICT devices with similar intensity (see Table II.B1.8.1).

Doing homework

While boys and girls often differ in how they spend their leisure time, the amount of time they spend on these activities and the amount of time they devote to homework, may also differ. Previous PISA cycles show that, in general, the amount of time students reported spending on homework varied significantly across countries and over time, as it may depend on the organisation of schooling and the type of homework assigned (OECD, 2013_[23]). While there may be no system-level relationship between the amount of time students devote to homework and overall performance in PISA, at the individual level, in several countries and economies homework time was correlated with student performance (OECD, 2014_[24]). This should not be interpreted in causal way. Doing homework regularly may help students consolidate their learning, or it may simply be a sign of engagement, defined as behavioural displays of effort, time and persistence in attaining desired outcomes (Klauda and Guthrie, 2014_[25]). Analyses of PISA 2012 results suggest that girls tend to spend more time than boys doing homework (OECD, 2015_[11]); was this still true in 2018?

Figure II.8.2 Gender gap in reading and ICT hobbies

Percentage of students engaging in the following activities every day or almost every day; OECD average



Notes: All differences between girls and boys are statistically significant (see Annex A3).

Categories related on ITC use was based on optional ICT familiarity questionnaire distributed in 31 OECD participating countries.

Categories are ranked in descending order of the difference between girls and boys.

Source: OECD, PISA 2018 Database, Tables II.B1.8.1 and II.B1.8.6.

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In a subset of 32 countries and economies that participated in PISA 2018, students were asked how long they studied before going to school and after school on the most recent day prior to the PISA test (response choices included “I did not study” and “I do not remember”). Students’ answers were averaged to measure the percentage of students who responded that they “did not study at all at home on the most recent day prior to the PISA test”, “studied at home but less than one hour”, and “studied at home more than one hour”.

On average across OECD countries where this optional questionnaire was distributed, 64% of boys and 73% of girls reported that they had studied at home for more than one hour on the day immediately prior to the PISA test (Table II.B1.8.13). On average across OECD countries, some 24% of boys and 18% of girls reported that they had not studied at home at all that day. In Albania, Italy, Kazakhstan, Korea, Malta and Panama, more than 75% of both boys and girls reported that they had studied at home for more than one hour on the day prior to the PISA test. By contrast, in Brazil, Denmark, Iceland and Ireland, more than 25% of both boys and girls reported that they had not studied at all during that day. But in almost all countries/economies with comparable data, girls were more likely than boys to report that they had studied at home. The largest differences were observed in Belgium, Croatia, Denmark, Lithuania, Poland and the United Kingdom, where the proportion of girls who reported that they had studied at home at least one hour during the most recent day prior to the PISA test was more than 10 percentage-points larger than the proportion of boys who reported so.

BOYS, GIRLS AND MOTIVATION TO ACHIEVE

Competition and motivation to master tasks

One of the most important factors related to achievement, both in school and in life, is the motivation to achieve (OECD, 2013_[26]). In many cases, people with less talent, but greater motivation to reach their goals, are more likely to succeed than those who have talent but are not capable of setting goals for themselves and staying focused on achieving them (Eccles and Wigfield, 2001_[27]; Duckworth et al., 2011_[28]). This drive may come from an internal or external source. Achievement motivation is intrinsic when it is sparked by an interest or enjoyment in the task itself. It is organic to the person, not a product of external pressure or a drive for external rewards. Achievement motivation is extrinsic when it comes from outside the person. Extrinsic motivation may come from social concerns, such as not wanting to disappoint a parent, or from a craving for rewards, like good marks or praise from teachers.

Research shows that internal motivation and achievement are mutually reinforcing (Schiefele, Stutz and Schaffner, 2016_[29]; Retelsdorf, Köller and Möller, 2011_[30]). Intrinsic motives increase engagement and may be related to the concept of work mastery, defined as the desire to work hard to master tasks. By contrast, external motivation has an ambiguous impact on achievement.

For instance, excessive emphasis on competition may undermine intrinsic motivation and generate anxiety. The pressure to get higher marks and the concern about receiving poor grades are some of the sources of stress most often cited by school-age children and adolescents; see Chapter 9 of *PISA 2018 Results (Volume III): What School Life means for Students' Lives* (OECD, 2019_[16]).

The degree to which students are motivated by intrinsic or extrinsic drives may vary depending on gender. As noted in the previous section, girls usually report greater enjoyment of reading, a component of intrinsic motivation. Meanwhile, boys tend to hold more positive attitudes towards competition.

Empirical evidence indicates that gender differences in attitudes towards competition may be formed early and persist (Gneezy and Rustichini, 2004_[31]; Niederle and Vesterlund, 2011_[32]; Lackner, 2016_[6]), even if the magnitude of these differences in attitudes towards competition is related to the prevailing social norms in a country/economy (Andersen et al., 2013_[33]).

PISA 2018 asked students whether they agree (“agree”, “strongly agree”, “disagree”, “strongly disagree”) with the following statements: “I enjoy working in situations involving competition with others”; “It is important for me to perform better than other people on a task”; and “I try harder when I’m in competition with other people”. Students’ responses were used to create an index of attitudes towards competition. Students were also asked whether they agree with the statements: “I find satisfaction in working as hard as I can”; “Once I start a task, I persist until it is finished”; “Part of the enjoyment I get from doing things is when I improve on my past performance”; and “If I am not good at something, I would rather keep struggling to master it than move on to something I may be good at”. Students’ responses were used to create an index of motivation to master tasks. These indices were standardised to have a mean of 0 and a standard deviation of 1 across OECD countries.

In this analysis, a positive attitude towards competition is defined as the dispositional desire to outperform others, while the motivation to master tasks is defined as the dispositional desire to work hard to achieve a goal (OECD, 2019_[34]). Research shows that these two components of approach-oriented achievement motivation are linked to different sets of antecedents and consequences. When assessing achievement motivation, it is important to measure these constructs separately (Baranik, Barron and Finney, 2007_[35]; Murayama and Elliot, 2012_[36]).

Generally, results from PISA 2018 confirm that girls are less likely than boys to report positive attitudes towards competition. On average across OECD countries in 2018, boys and girls differed in their attitudes towards competition by 0.27 of a standard deviation. In 64 of the 79 countries and economies that participated in PISA 2018, girls expressed less positive attitudes towards competition than boys did (Figure II.8.3). However, cross-country comparisons show large variations in the magnitude, and even the direction, of the gender gap. In France, Portugal, the United Kingdom and Uruguay, boys were much more likely than girls (by more than 0.4 of a standard deviation) to express positive attitudes towards competition. By contrast, in Albania, Brunei Darussalam, Georgia, Indonesia, Jordan, Malaysia, Morocco, Qatar, Saudi Arabia and the United Arab Emirates, girls reported significantly more positive attitudes towards competition than boys. In Bulgaria, Japan and Kazakhstan, girls and boys reported similar, and negative, attitudes towards competition.

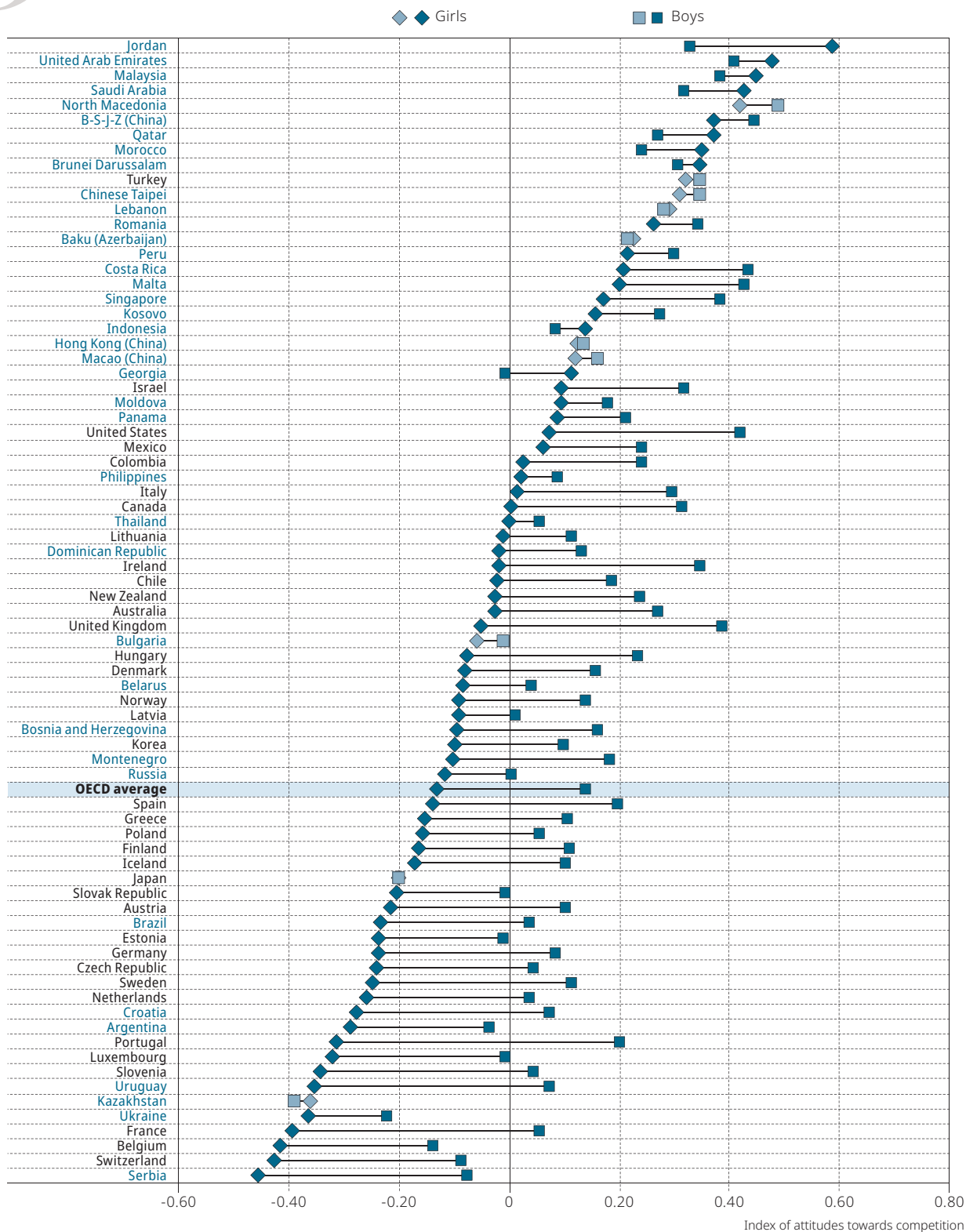
Girls were more likely than boys to report positive attitudes towards mastering tasks. On average across OECD countries, the index of motivation to master tasks was higher amongst girls than amongst boys by 0.14 of a standard deviation. Only in 10 of the 79 PISA-participating countries/economies, namely Beijing, Shanghai, Jiangsu and Zhejiang (China) (hereafter “B-S-J-Z [China]”), Belarus, Hong Kong (China), Hungary, Iceland, Korea, the Netherlands, Russia, Sweden and Chinese Taipei, were these differences not significantly positive (Figure II.8.4). Korea is the only country where boys were more likely than girls to report greater motivation to master tasks.

Perceived competence and difficulty in reading

Adolescence is a time when people play with their sense of self, when they experiment with their identity, compare themselves with others, and develop the basis of a self-concept that may last the rest of their lives. Students’ self-concept, or their belief in their own abilities, is an important outcome of education and strongly related to successful learning (Marsh and O’Mara, 2008_[37]; Guo et al., 2016_[38]). Longitudinal studies of self-concept and achievement show that they are mutually reinforcing over time (Marsh and Martin, 2011_[39]; Niepel, Brunner and Preckel, 2014_[40]; Arens, Schmidt and Preckel, 2019_[41]). Self-concept can also affect well-being and personality development. Students’ beliefs in their own competence can also be affected by gender stereotypes perpetuated by parents, peers or teachers (Retelsdorf, Schwartz and Asbrock, 2015_[42]).

PISA 2018 measured students’ reading self-concept through self-reports on whether students agree (“strongly agree”, “agree”, “disagree”, “strongly disagree”) that they are good readers; that they are able to understand difficult texts; that they read fluently; that they have always had difficulty with reading; that they have to read a text several times before completely understanding it; and that they find it difficult to answer questions about a text. Students’ responses were summarised in two indices of reading self-concept: one measuring the perception of competence and the other measuring the perception of difficulty with reading. Both indices were standardised to have a mean of 0 and a standard deviation of 1 across OECD countries.

Figure II.8.3 Gender gap in attitudes towards competition



Notes: Statistically significant differences between girls and boys are marked in a darker tone (see Annex A3). "Attitudes towards competition" represents the competitiveness of the student and not the perception of competitiveness at school. Countries and economies are ranked in descending order of the mean index of attitudes towards competition amongst girls.

Source: OECD, PISA 2018 Database, Table II.B1.8.14.

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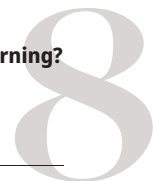
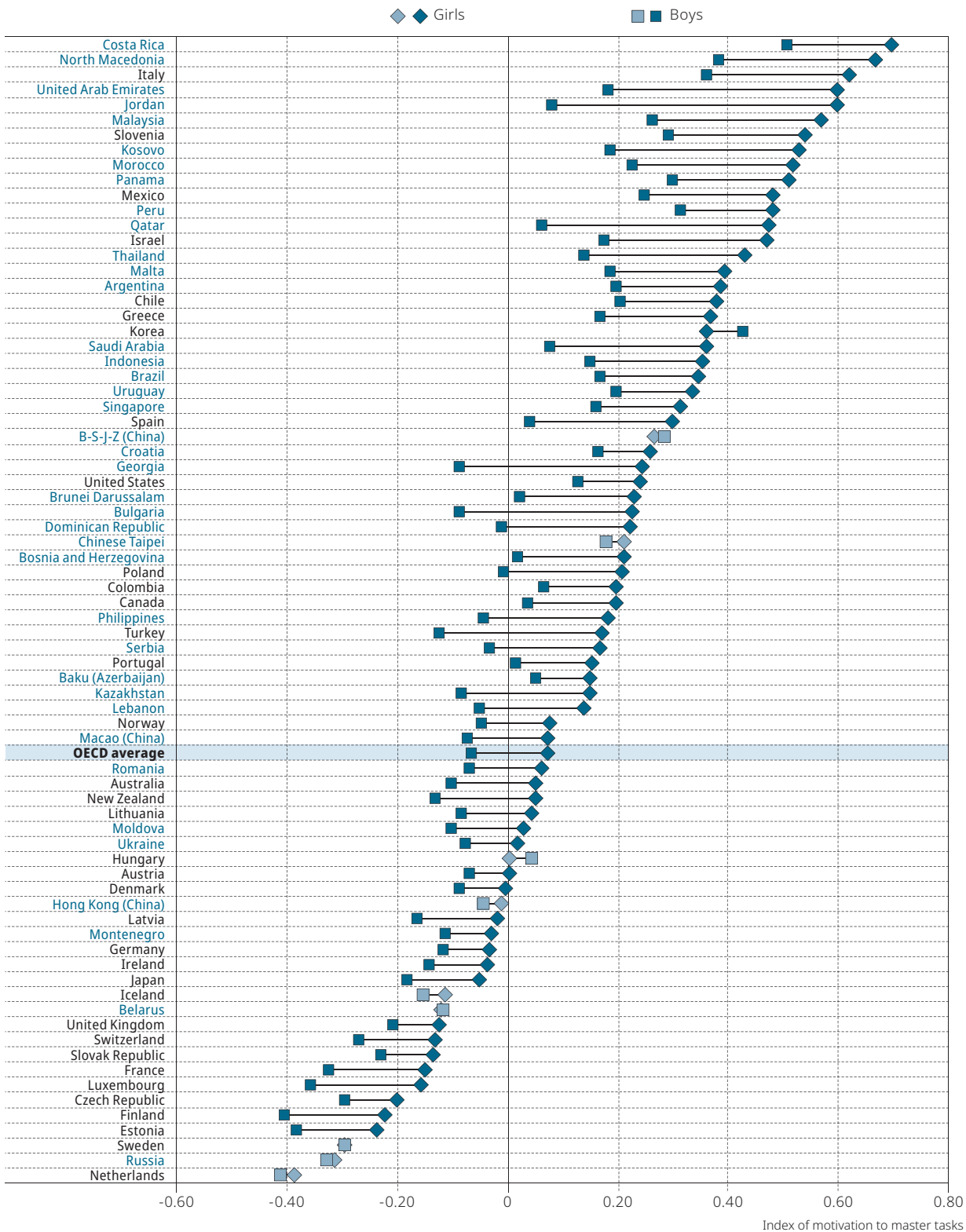


Figure II.8.4 Gender gap in motivation to master tasks



Note: Statistically significant differences between girls and boys are marked in a darker tone (see Annex A3).
 Countries and economies are ranked in descending order of the mean index of motivation to master tasks amongst girls.

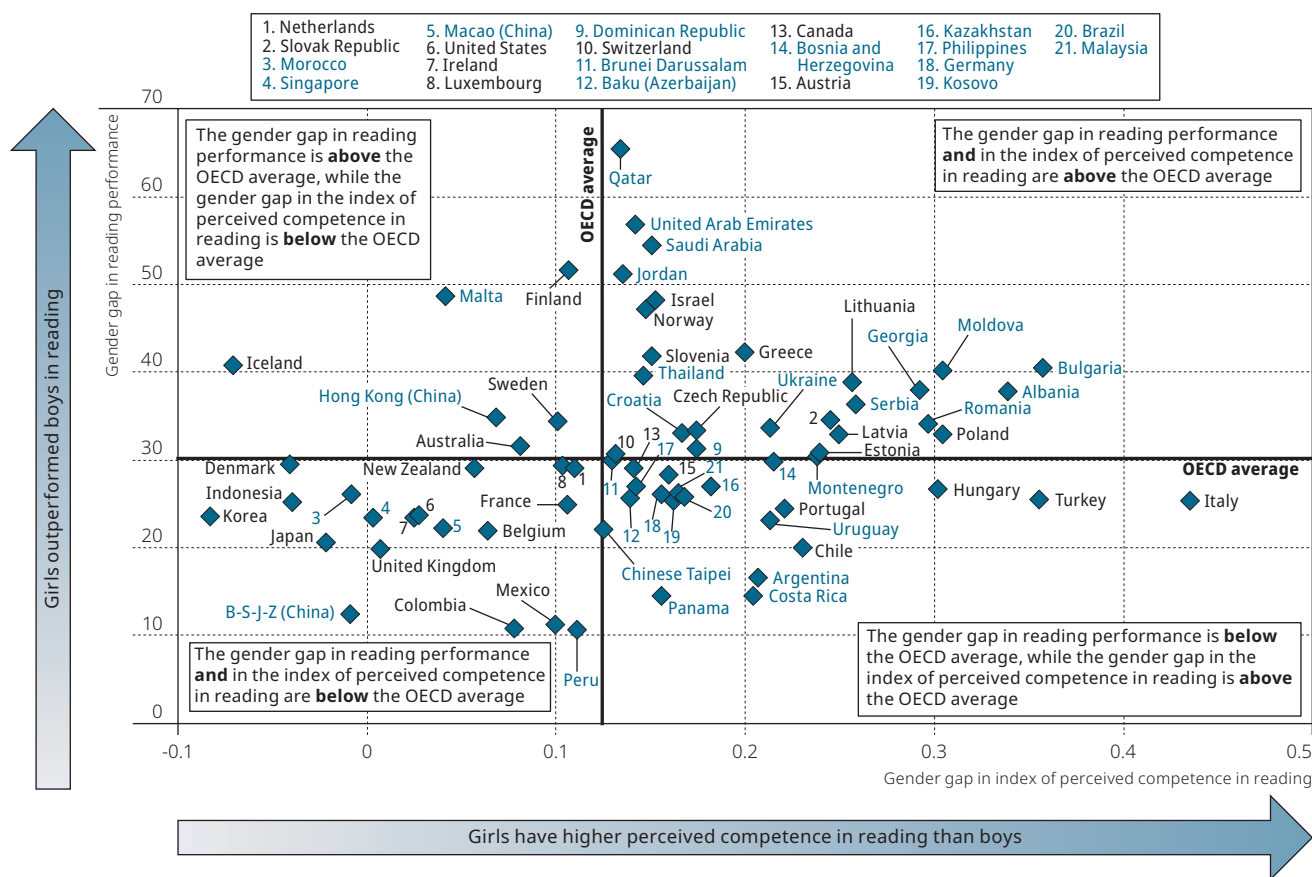
Source: OECD, PISA 2018 Database, Table II.B1.8.14.

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In general, girls were more likely than boys to report greater perceived competence in reading (Table II.B1.8.15). On average across OECD countries, the gender gap in perceived reading competence was around 0.1 of a standard deviation. Only in Korea did girls report less competence in reading than boys did. On average, girls were much more likely than boys to describe themselves as “good readers”. This is not surprising, given girls’ better performance in reading (see Chapter 7). However, the gender gap in perceived competence in reading did not seem to be statistically associated with the gender gap in reading performance (Figure II.8.5). In Denmark, Finland, Iceland, Ireland, Japan, Korea, Malta, Morocco, New Zealand, Singapore and the United Kingdom, when comparing boys and girls with similar scores in reading, girls reported significantly less competence in reading than boys, on average. In 30 countries and economies, girls were more likely than boys, on average, to report that they had difficulty reading – even though they were more often top performers in reading. While girls reported more often than boys that they read fluently, they were also less likely than boys to report that they can understand difficult texts. All of the above may suggest that girls tend to lack confidence in their own abilities.

Figure II.8.5 Gender gap in reading performance and perceived competence in reading



Note: The gender gap refers to the difference between girls and boys (girls minus boys).

Source: OECD, PISA 2018 Database, Tables II.B1.7.1 and II.B1.8.16.

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Fear of failure

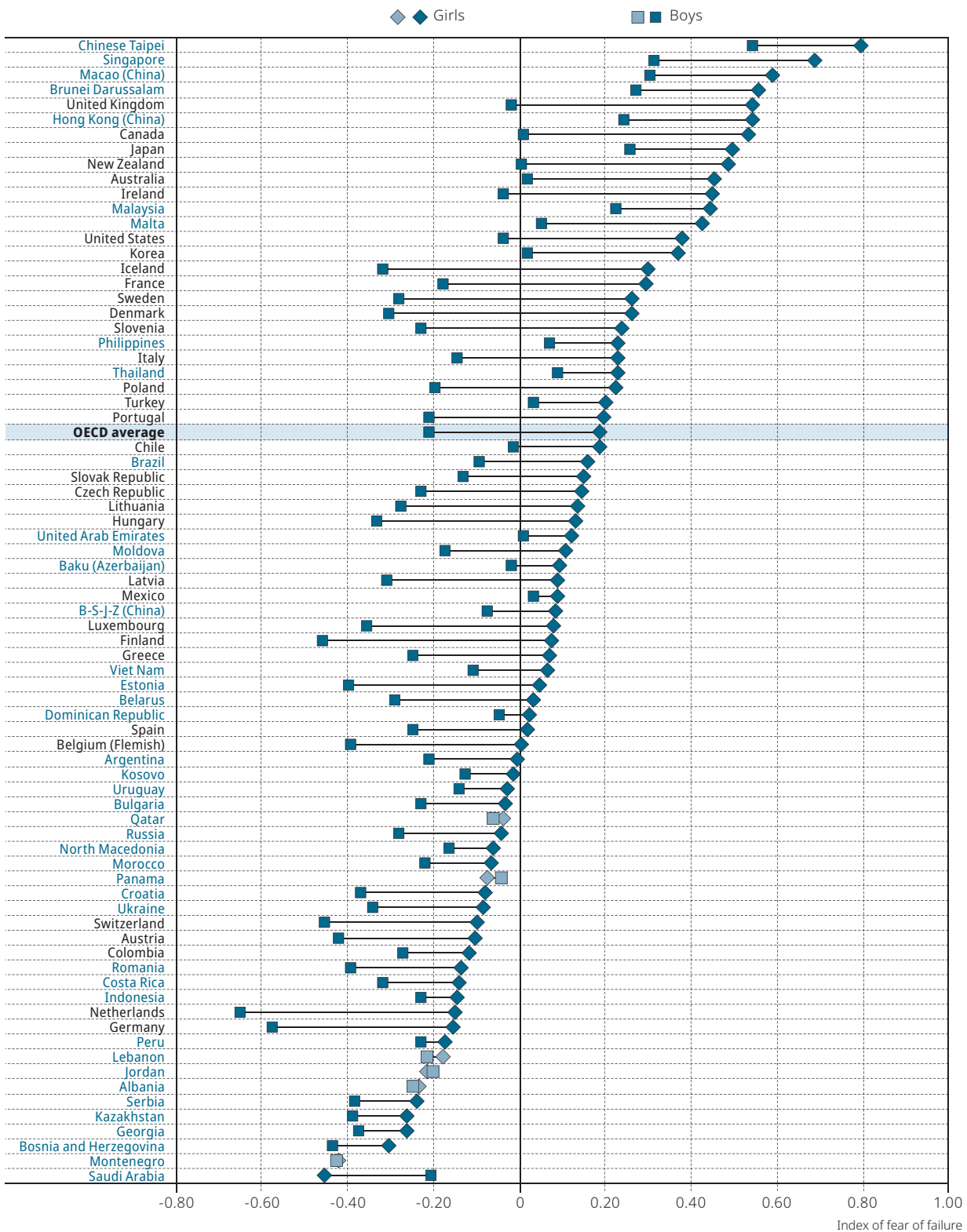
Fear of failure may prompt teenagers to avoid taking calculated risks because failure to achieve their goal may be regarded as shameful. Research has shown that fear of failure leads students to be self-protective and thus avoid challenging situations and opportunities that are essential for learning and development (Conroy, Kaye and Fifer, 2007_[43]; De Castella, Byrne and Covington, 2013_[44]). Previous results from PISA suggest that countries where students have high motivation to achieve also tend to be those where many students feel anxious about sitting a test, even if they are well-prepared for it (OECD, 2017_[45]).

PISA 2018 asked students whether they agree (“strongly agree”, “agree”, “disagree”, “strongly disagree”) with the following statements: “When I am failing, I worry about what others think of me”; “When I am failing, I am afraid that I might not have enough talent”; and “When I am failing, this makes me doubt my plans for the future”. Students’ responses were used to create an index of fear of failure. The index was standardised to have a mean of 0 and a standard deviation of 1 across OECD countries.

In general, boys and girls reported experiencing the fear of failure differently. In 70 countries and economies that participated in PISA 2018, girls reported more often, and to a larger extent, than boys that they fear failure (Figure 1.6). On average across OECD

countries, the magnitude of the gender gap in fear of failure was as large as 0.4 of a standard deviation. In 22 PISA-participating countries and economies, the gender gap in the fear of failure was larger than the overall OECD average gender gap; in another 26 countries/economies, the difference in fear of failure ranged from 0.2 to 0.4 of a standard deviation.

Figure II.8.6 Gender gap in fear of failure



Note: Statistically significant differences between girls and boys are marked in a darker tone (see Annex A3). Countries and economies are ranked in descending order of the mean index of fear of failure amongst girls.

Source: OECD, PISA 2018 Database, Table II.B1.8.18.

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8 Do boys and girls differ in their attitudes towards school and learning?

On average across OECD countries, 51% of boys but 61% of girls agreed or strongly agreed with the statement: “When I am failing, I worry about what others think of me”. But while slightly less than one in two boys reported that when they fail, it makes them afraid that they might not have enough talent, or doubt about their future, almost two in three girls reported so. Analyses on how students’ satisfaction with life and other feelings about their environment differ between boys and girls are presented in more detail in Chapter 13 of *PISA 2018 Results (Volume III): What School Life Means for Students’ Lives* (OECD, 2019_[16]).

Prepared for tomorrow? Boys’ and girls’ expectations about their future career

Children and adolescents are exposed to stereotyped gender roles in their immediate environment through their families, at school, and also through educational resources, the media and popular culture (Olsson and Martiny, 2018_[46]). In most Western countries, men are under-represented in “nurturing” roles, such as those in the healthcare, elementary education and domestic sectors, whereas women are under-represented in high-status roles, such as leadership positions (Croft, Schmader and Block, 2015_[47]), and in the science, technology, engineering and mathematics (STEM) fields. In this context, it is not surprising to observe that teenagers’ expectations for their careers as young adults mirror these stereotypes (see Table II.6.1 in Chapter 6).

Promoting more equal representation of men and women in different occupations is not only a way to reduce the gender gap in the labour market and improve gender equality, it is also a prerequisite for meeting the many challenges facing societies around the world. STEM jobs contribute to innovation and productivity growth in most advanced economies; shortages of workers for these jobs are damaging to society. Labour shortages in healthcare are also a concern, especially in ageing societies. Gender-related biases in teenagers’ aspirations may thus have adverse consequences not only for the individual, but for society too. For this reason, several countries are implementing various initiatives and interventions to encourage boys and girls to consider non-traditional occupational choices. How is this reflected in boys’ and girls’ career expectations?

PISA 2018 asked students about the level of education they expect to complete and what occupation they expect to be working in when they are around 30 years old (Chapter 6). For the latter question, students could enter any job title or description in an open-entry field; their answers were classified according to the International Standard Classification of Occupations (ISCO-08). One may thus identify “science and engineering professional”, “health professional”, “information and communication technology (ICT) professional” and “science technicians and associate professional” from amongst the careers they cite (see Annex A1 for details).

On average across OECD countries in 2018, around one in three students reported that they expect to work in a science-related occupation when they are around 30 (Table II.B1.8.19). Large variations were observed between countries/economies, though. In Baku (Azerbaijan), B-S-J-Z (China), the Czech Republic, Germany, Indonesia, Korea, Switzerland, Ukraine and Viet Nam, less than 25% of students reported that they expect to work in a science-related occupation, while in Brazil, Canada, Costa Rica, the Dominican Republic, Jordan, Lebanon, Mexico, Qatar, the United Arab Emirates and the United States, more than 45% of students so reported.

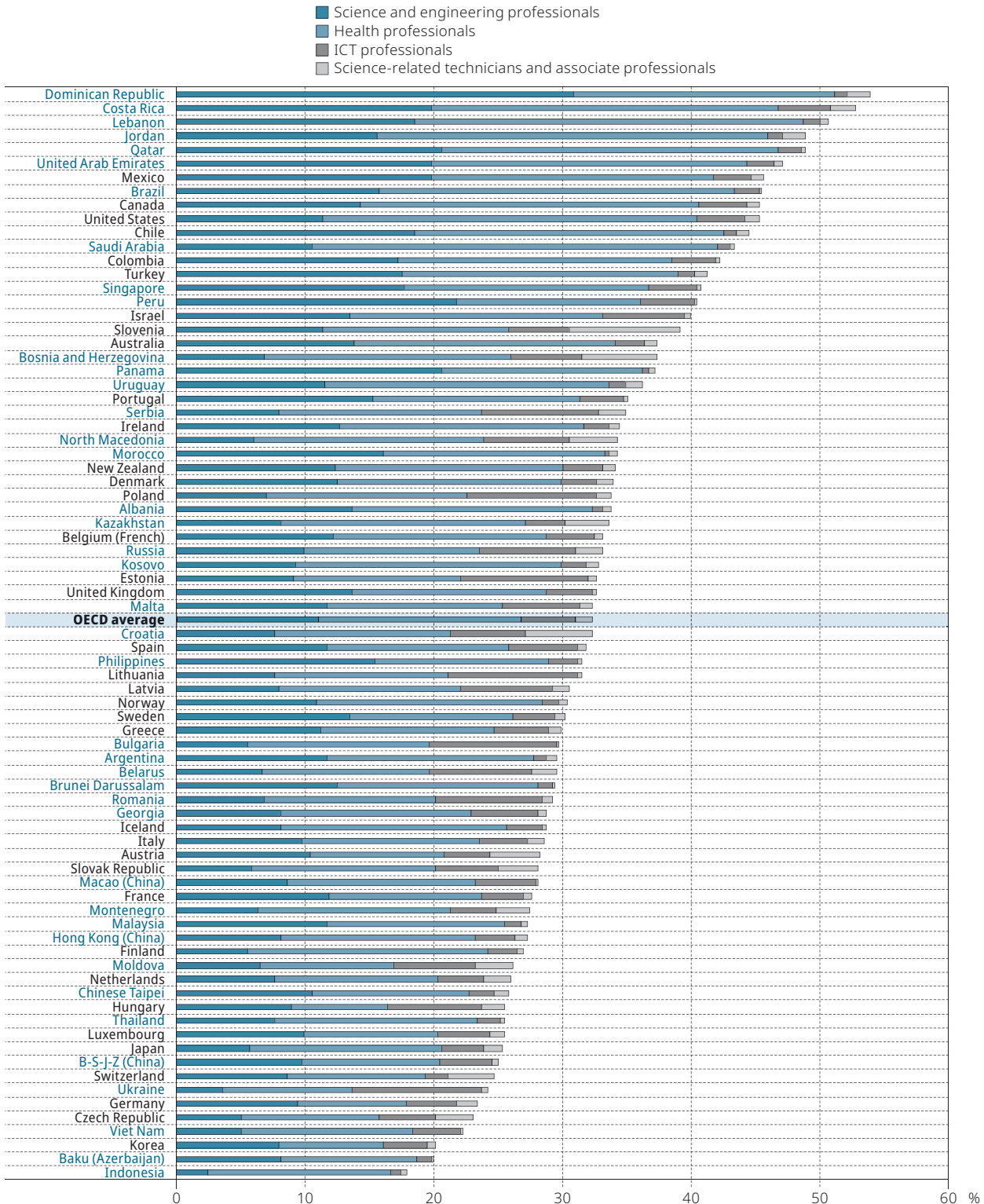
In general, similar proportions of girls and boys reported that they are interested in a science-related career. However, decompositions by type of occupation show much more differentiated patterns between the genders. Specifically, 15% of boys but only 7% of girls reported that they expect to work as professionals who use science and engineering training (e.g. engineer, architect, physicist, astronomer); and in all PISA-participating countries/economies, more boys than girls reported that they expect to work in these types of occupations. The gender gap in expectations to become an engineer (or any related occupation) was especially wide in Colombia, the Dominican Republic, Mexico, Portugal and Singapore, where it exceeded 15 percentage points. These were also countries where more than one in five boys reported that they expect to work as an engineer or in a similar occupation. By contrast, in Greece and Morocco more than 10% of students (the OECD average share) reported that they expect to work as professionals who use science and engineering training, while the gender gap in expectations of working in these occupations was smaller than 5 percentage points.

Expectations about working in ICT-related occupations also appear to be highly gender-biased. Only a tiny share of girls – 1% – reported that they want to work as ICT professionals (e.g. software developer, applications programmer) compared with 8% of boys who so reported. While in some countries, such as Bulgaria, Estonia, Lithuania, Poland, Serbia and Ukraine, more than 15% of boys reported that they expect to work in an ICT-related profession, in no PISA-participating country or economy did this share exceed 3% amongst girls.

In addition, the gender gap in interest in these occupations tended to widen over the past few years. The proportion of boys who reported that they expect to work as ICT professionals had increased between 2015 and 2018 by 1.1 percentage points, but the proportion of girls who reported so increased by only 0.2 of a percentage point during the same period (Table II.B1.8.21). In Israel, Lithuania and Poland, the share of boys who reported that they expect to work in these occupations grew by more than five percentage points between 2015 and 2018; but nowhere did the share of girls who so reported grow by more than two percentage points. In some countries the gender gap in favour of boys narrowed, but not because of a greater interest amongst girls. Rather, in Australia, Austria, Colombia, the Dominican Republic, Iceland, Ireland, Switzerland, Chinese Taipei and Uruguay, boys lost interest in these professions.

Figure II.8.7 **Expectation to work in science-related occupations**

Percentage of students who reported that they expect to work in science-related occupations and technical occupations when they are 30

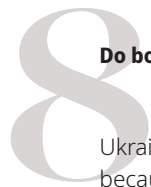


Countries and economies are ranked in descending order of the percentage of students who reported that they expect to work in a science-related occupation.

Source: OECD, PISA 2018 Database, Table II.B1.8.19.

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When considering the “care” professions, the picture looks much different. On average across OECD countries, only 8% of boys but as much as 23% of girls reported that they expect to work as a health professional (e.g. medical doctor, nurse, veterinarian, physiotherapist). In Brazil, Saudi Arabia and the United States, about 40% of 15-year-old girls reported so, compared to less than 20% of boys. In B-S-J-Z (China), Georgia, Germany, Hungary, Italy, Korea, Luxembourg, Malta, the Republic of Moldova, Panama,



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Ukraine and Viet Nam, the gender gap in expectations of a career in health amounted to less than 10 percentage points, mainly because girls in these countries/economies were less likely to expect to work in such careers.

Students' expectations about their future work partly reflect the opportunities and support available to them, in their country and in their local environment, to turn their aspirations into reality. This may partly explain the large variations in the gender gap in career expectations observed between countries (Stoet and Geary, 2018_[77]). Students' career expectations also tend to be shaped by what students consider to be their academic strengths (see, for instance, Table II.B1.6.5 in Chapter 6). However, previous analyses also suggest that girls are less likely than boys to believe in their abilities, especially in mathematics. This lack of self-confidence may be one of the first fissures that widen into the gender gap in students' pathways towards science-related careers (Perez-Felkner, Nix and Thomas, 2017_[48]).

On average across OECD countries, only 14% of girls but more than 26% of boys, amongst students who had attained Level 2 of proficiency in all three core PISA subjects (reading, mathematics and science), and a high level of proficiency in science or mathematics (PISA proficiency Level 5 or 6), reported that they expect to work as professionals who use science and engineering training (see Figure II.8.8). In several countries, the gender gap is not significant, including those countries with high proportions of top performers in science or mathematics, such as Estonia, Finland, Poland and Slovenia, where 15% of boys and girls were top performers and they were equally likely to report that they expect to work in such occupations. But in 22 countries and economies, the gender gap in the expectation to work as an engineer amongst high achievers in science or mathematics was larger than 15 percentage points; and in Colombia, Malaysia, Norway, Peru and Portugal, the gap was larger than 20 percentage points.

Box II.8.1. How to narrow, if not close, the gender gap in STEM

The absence of role models is often cited as one reason for the persistent under-representation of women in science, technology, engineering and mathematics – even as the gender gap in mathematics and science performance has almost closed in many countries. Society, and notably parents and teachers, may convey stereotypes and social norms that influence the choices girls and boys make about their future. The dearth of women in science means that girls may feel that a career in science is somehow “inappropriate” for them. Making female role models more visible could help change this.

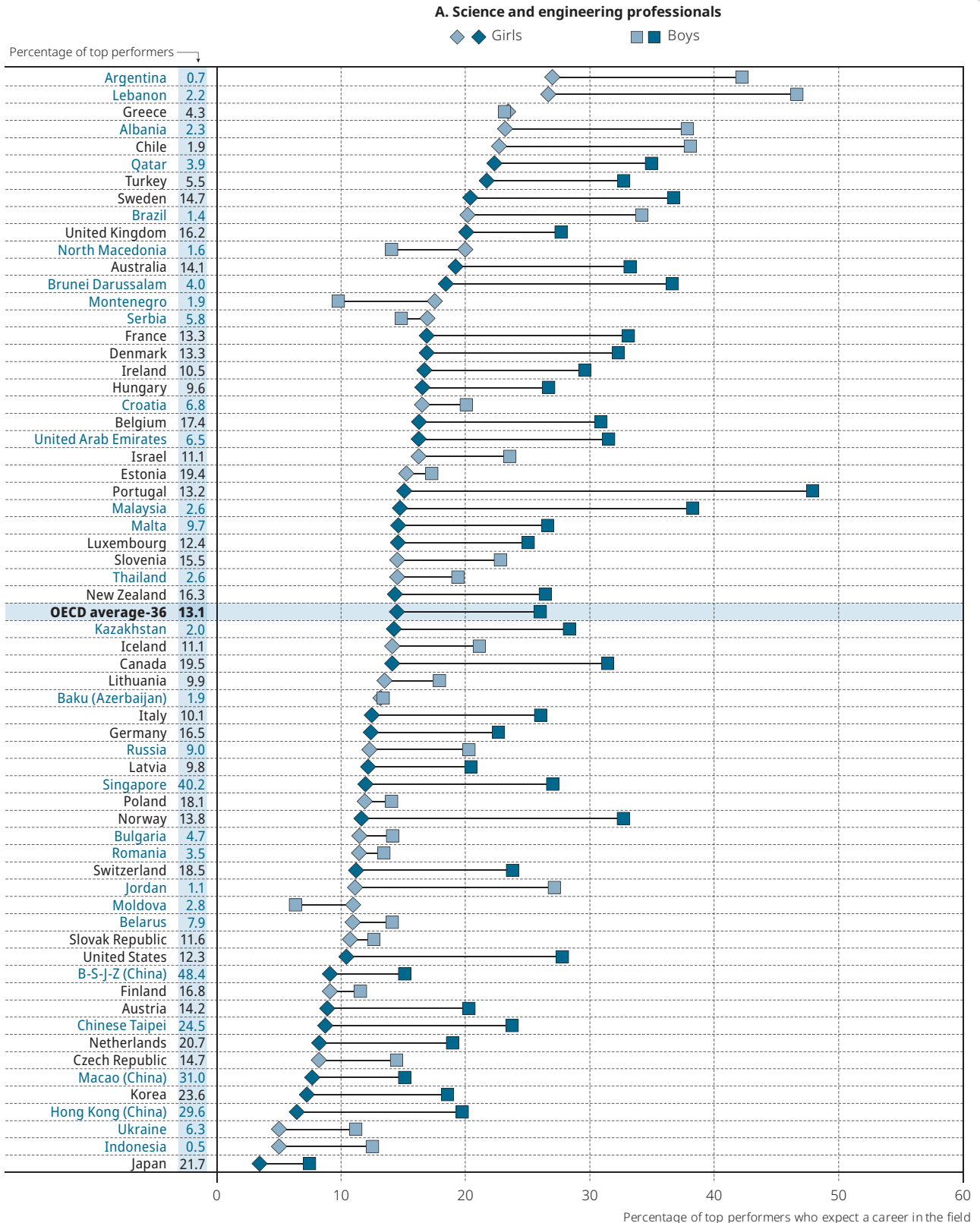
Research on students in the US Air Force Academy shows that being (randomly) assigned to a female instructor in mandatory introductory mathematics and science courses had no impact amongst male students on their decision to continue studying these subjects in the future; but it increased the likelihood that female students, especially the highest achievers, would take mathematics and science courses the following year (Carrell, Page and West, 2010_[49]). These results are mirrored in a large-scale experiment conducted in the Paris area that showed that a single, one-hour discussion with female engineers significantly increased the proportion of high-performing girls in grade 12 who decided to enrol in (male-dominated) selective STEM studies in France (Breda et al., 2018_[50]).

Fighting stereotypes about the relative strengths of boys and girls in certain fields of study may also be an effective way to narrow gender gaps in preferred occupations. For instance, a study measuring the gender-bias behaviour of teachers in primary schools in Tel-Aviv, Israel (estimated by comparing the average marks boys and girls were awarded in a “non-blind” exam to the gender means in a anonymously marked “blind” national exam) suggests that being assigned to a teacher with a greater bias in favour of one gender has a significant positive impact on the further achievement of students of that gender, and on enrolment in advanced mathematics courses in high school (Lavy and Sand, 2018_[51]).

While computer science is one the fields with the smallest representation of women, providing girls with opportunities to interact with technology at the earliest ages may increase their sense of self-efficacy and strengthen their engagement with science. For instance, a recent study shows that six-year-olds expressed stereotyped views about boys being better than girls at robots and programming. The authors also show that first-grade girls who were given an opportunity to try programming showed greater interest in technology and self-efficacy in programming than randomly selected girls of a similar age, and that the experience eliminated gender differences in interest and self-efficacy in technology (Master et al., 2017_[52]).

Source: Carrel et al. (2010), “Sex and science: how professor gender perpetuates the gender gap”, <https://doi.org/10.1162/jjec.2010.125.3.1101>; Breda et al. (2018), “Can female role models reduce the gender gap in science? Evidence from classroom interventions in French high schools”, <https://halshs.archives-ouvertes.fr/halshs-01713068>; Lavy and Sand (2018), “On the origins of gender gaps in human capital: Short- and long-term consequences of teachers' biases”, <https://doi.org/10.1016/j.jpubeco.2018.09.007>; Master et al. (2017), “Programming experience promotes higher STEM motivation among first-grade girls” <http://dx.doi.org/10.1016/j.jecp.2017.03.013>

Figure II.8.8 [1/2] Gender gap in career expectations amongst top performers in mathematics and/or science



Notes: Statistically significant differences between girls and boys are shown in a darker tone (see Annex A3).

For students' career expectations, results are only available for the French community in Belgium.

In this figure, "top performers" refers to students who attain at least Level 2 in all three core subjects and Level 5 or 6 in mathematics and/or science.

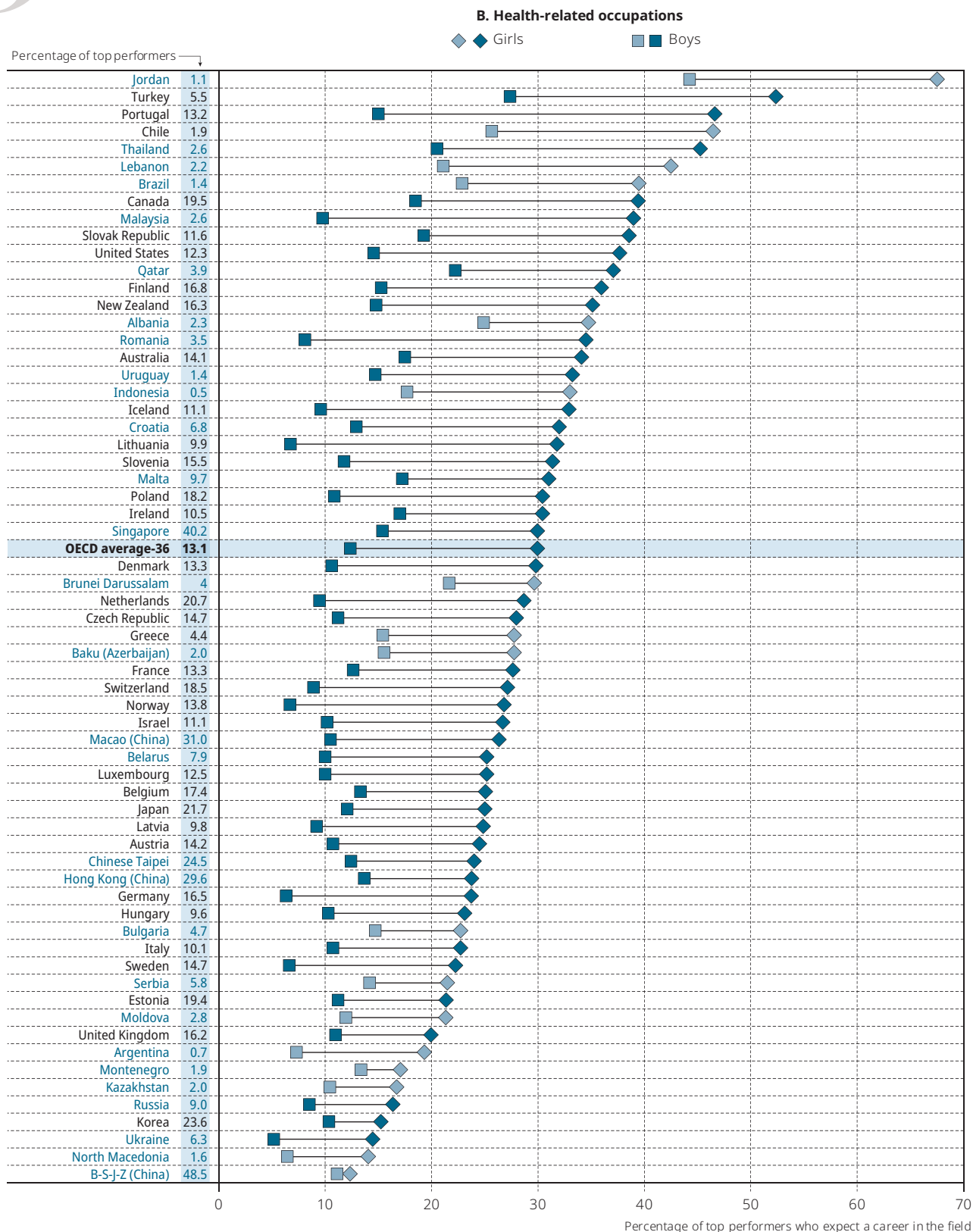
Countries and economies are ranked in descending order of the percentage of top performing girls who expect a career in the field.

OECD average-36 refers to the arithmetic mean across OECD countries (and Colombia), excluding Spain.

Source: OECD, PISA 2018 Database, Tables II.B1.8.22 and II.B1.8.23.

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Figure II.8.8 [2/2] Gender gap in career expectations amongst top performers in mathematics and/or science



Notes: Statistically significant differences between girls and boys are shown in a darker tone (see Annex A3).
 For students' career expectations, results are only available for the French community in Belgium.
 In this figure, "top performers" refers to students who attain at least Level 2 in all three core subjects and Level 5 or 6 in mathematics and/or science.
 OECD average-36 refers to the arithmetic mean across OECD countries (and Colombia), excluding Spain.
 Countries and economies are ranked in descending order of the percentage of top performing girls who expect a career in the field.

Source: OECD, PISA 2018 Database, Tables II.B1.8.22 and II.B1.8.23.

StatLink <https://doi.org/10.1787/888934038210>

Notes

1. For a meta-review of the no cognitive skills impact on educational achievement see also Koch, Nafziger and Nielsen, 2015^[56].
2. Enjoyment of reading is usually strongly related to reading achievement – for a meta-review see Petscher, 2009^[57] – but evidence on the causal link between these two constructs is scarce. A longitudinal analysis over a sample of 150 students enrolled in second grade in one school in the United States suggests that reading attitudes and achievement appear unrelated at the early stages of reading, but they become more closely linked over time, as both primary reading attitudes and primary reading achievement are predictors of reading achievement in the 7th grade (Kush, Watkins and Brookhart, 2005^[58]).

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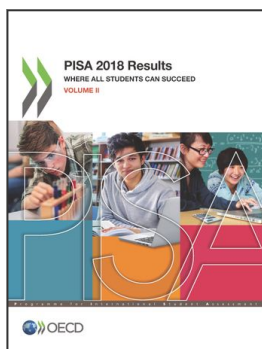
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From:
PISA 2018 Results (Volume II)
Where All Students Can Succeed

Access the complete publication at:
<https://doi.org/10.1787/b5fd1b8f-en>

Please cite this chapter as:

OECD (2020), “Do boys and girls differ in their attitudes towards school and learning?”, in *PISA 2018 Results (Volume II): Where All Students Can Succeed*, OECD Publishing, Paris.

DOI: <https://doi.org/10.1787/f54b6a75-en>

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