13

Students' use of ICT outside of school

This chapter describes how students spend their time on line outside of school. It examines students' access to the Internet, how they use the web, and the relationship between online activities – and the number of hours spent on line – and students' well-being. The chapter also discusses the digital divides related to socio-economic status that persist both between and within countries.

Over the past two decades, information and communication technologies (ICT) have transformed the ways 15-year-old students learn, socialise and play (OECD, 2015). Internet tools, including online networks, social media and interactive technologies, are giving rise to new learning styles where young people see themselves as agents of their own learning, and where they can produce multimedia content, update and redefine their interests, and learn more about the world, others and themselves. Using ICT at school allows students to access learning material tailored to their age and interests, promotes positive social behaviour, such as teamwork (American Academy of Pediatrics, Commitee on Public Education, 2001), and enables discussions with other young people around the globe.

What the data tell us

- Between 2006 and 2015, home access to the Internet became almost universal for students in most PISA-participating countries and economies. By 2015, 95% of students, on average across OECD countries, reported they had a link to the Internet at home. But in some participating countries and economies, such as Mexico and Peru, only one in two students could access the Internet from their home.
- On average across OECD countries, students spend more than two hours on line during a typical weekday after school, and more than three hours on line during a typical weekend day. Between 2012 and 2015, the time spent on line outside of school increased by at least 40 minutes per day on both weekdays and weekends.
- The majority of students reported that the Internet is a great resource for obtaining information, and more than one in two students in OECD countries reported that they feel bad if no Internet connection is available.
- Students who spend more than six hours on line per weekday outside of school were more likely to report that they are not satisfied with their life or that they feel lonely at school, and were less proficient in science than students who spend fewer hours on line.

But adolescents' use of ICT is also a source of concern among parents, teachers and policy makers. Students might develop dangerous relationships with strangers on line or may become victims of cyberbullying (Smith et al., 2008). Extreme videogaming, compulsive texting and overuse of smartphones are also increasingly documented. These behaviours can have serious physical, social, psychological and cognitive consequences. For example, spending long hours staring at screens is associated with less physical activity, sleeping disorders and obesity (Currie et al., 2012; Punamäki et al., 2007). Excessive use of ICT also undermines motivation and academic achievement (Borgonovi, 2016; Johnson et al., 2007), and can lead to social isolation and depression (Finn and Gorr, 1988; Kim et al., 2006; Wood et al., 2004).

This chapter uses PISA 2015 data to describe how students spend their time on line outside of school. In particular, it investigates students' access to the Internet, how they use the web, and the relationship between online activities and students' cognitive, social and psychological well-being. The results also illustrate the digital divides related to socio-economic status that persist both between and within countries.

CHANGES IN STUDENTS' ACCESS TO ICT AT HOME

Access to the Internet and digital devices at home

By 2015, the Internet had become an everyday tool for most 15-year-old students. Most digital devices are connected to the Internet to access web-based services, such as social networking sites, cloud computing services, online wikis or videogames. 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. Without an Internet connection at home, students might have only limited access to information that is important for their cognitive development.

Data collected from students participating in the PISA assessment show that, by 2015, almost every student (95%) in most OECD countries reported that they had a link to the Internet at home. However, this average masks large differences between countries and economies. In Denmark, Estonia, Finland, Iceland, Norway, Slovenia and Switzerland, almost all students had Internet access at home. In the lower-income countries of Algeria, Indonesia, Peru and Viet Nam, fewer than one in two students reported that they had Internet access at home (Table III.10.4).

Between 2006 and 2015, hundreds of thousands of students gained access to the Internet from their homes for the first time (Figure III.13.1). The expansion in Internet access was the greatest in Chile, Romania, the Russian Federation (hereafter "Russia") and the Slovak Republic, with an increase of more than 50 percentage points in the population of "wired" 15-year-olds (Table III.10.4). In almost all countries and economies, Internet access increased between the shorter period of 2012 to 2015. The largest increases during this period – those greater than 15 percentage points – were observed in Albania, Thailand, Tunisia and Viet Nam (Table III.10.5).

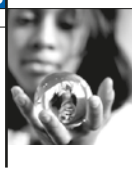
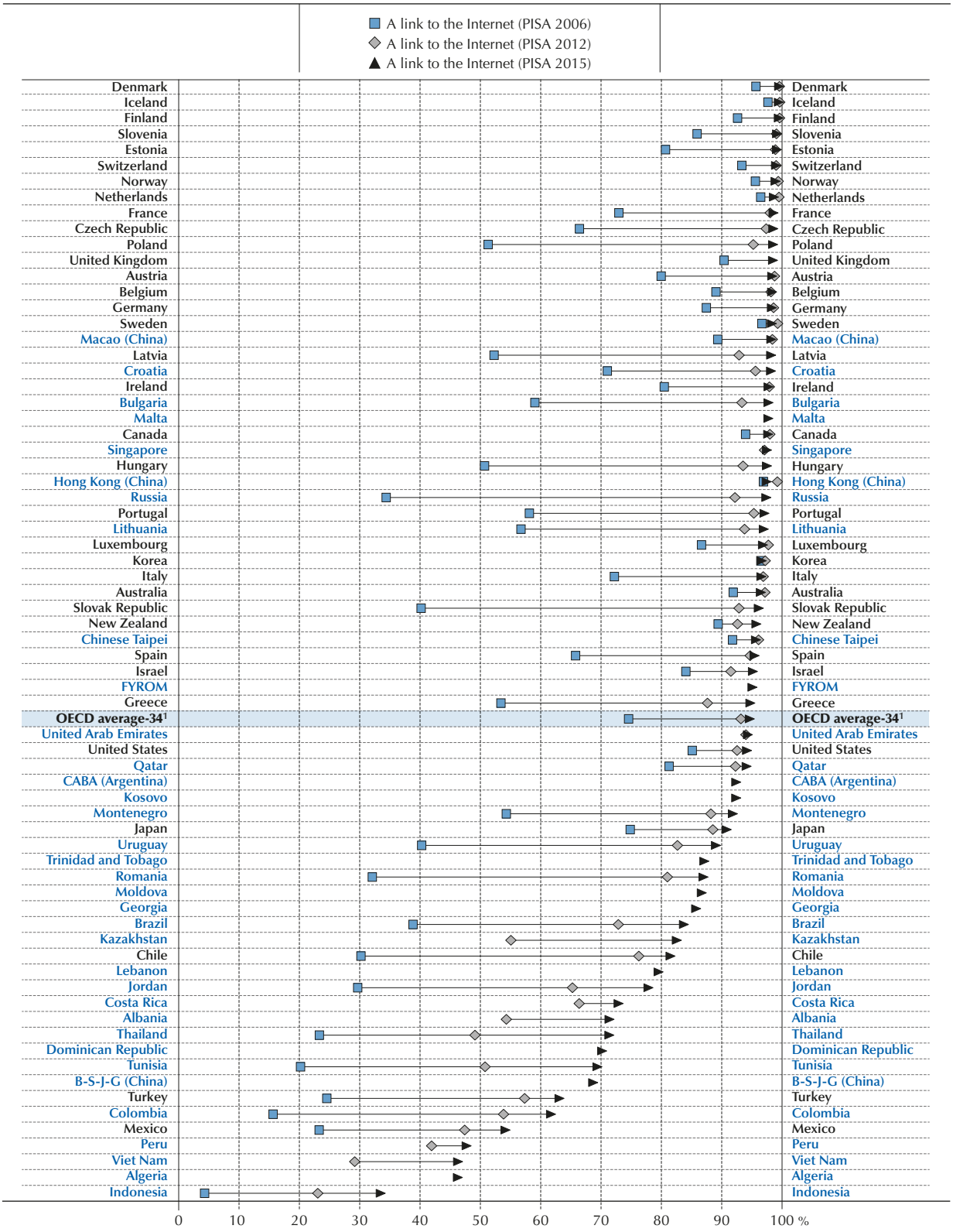


Figure III.13.1 ■ Change from 2006 through 2012 and 2015 in students' access to the Internet at home



1. "OECD average-34" includes all OECD countries with available data for PISA 2006, PISA 2012 and PISA 2015.

Countries and economies are ranked in descending order of the percentage of students who accessed the Internet at home in 2015.

Source: OECD, PISA 2006 and 2015 Databases, Tables III.10.4 and III.10.5.

StatLink http://dx.doi.org/10.1787/888933473446

In 2015, 91% of students had access to a cell phone at home that was connected to the Internet (smartphone), 74% had access to a portable laptop, 60% had access to a desktop computer and 53% had access to a tablet that was connected to the Internet. But large differences in ownership of digital devices are observed between countries and economies. In Australia, Austria, Belgium, Denmark, Iceland, Luxembourg, the Netherlands and Portugal, more than 80% of students had access to a portable laptop or a notebook at home. In Beijing-Shanghai-Jiangsu-Guangdong (China) (hereafter "B-S-J-G [China]"), the Dominican Republic and Peru, less than 40% of students had access to such devices. In Colombia, the Dominican Republic, Mexico and Peru, only two in three students had access to a smartphone at home (Table III.13.4).

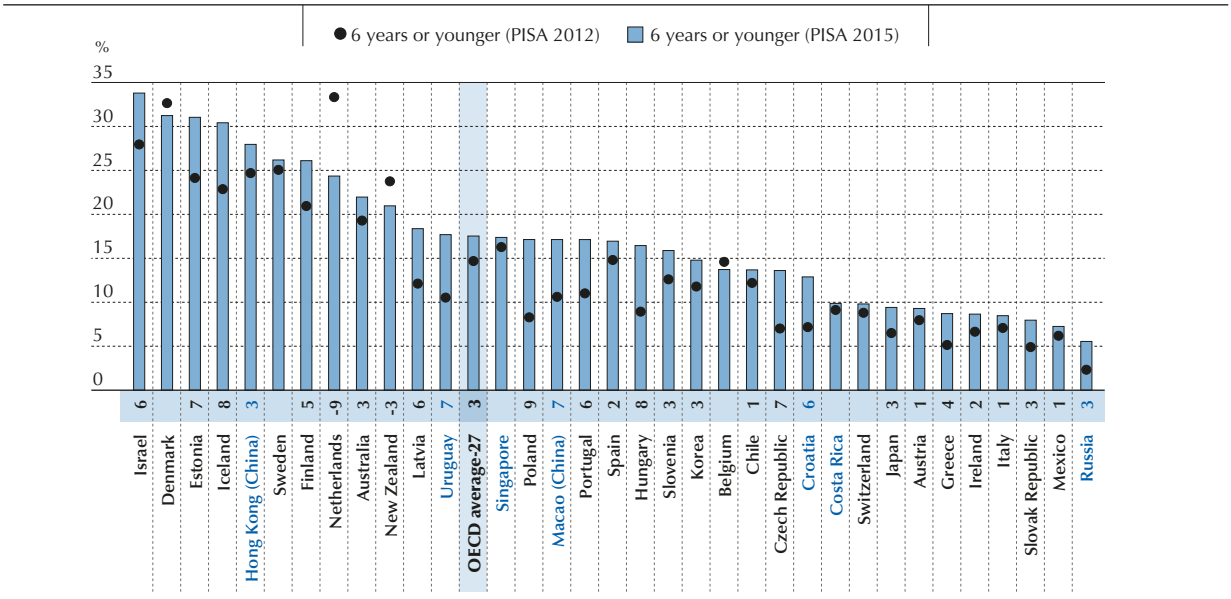
Between 2012 and 2015, the share of 15-year-old students across OECD countries who had access to a smartphone increased by 19 percentage points. Access to connected tablets at home increased by an even larger margin: 30 percentage points. These data not only show the fast-growing popularity of these tools, but also signal the enormous changes in teenagers' behaviour and activities outside of school (Table III.13.4).

Students use of the Internet

Around the world, increasing numbers of children start playing with connected devices even before they can read well. On average across OECD countries, 61% of students reported that they accessed the Internet for the first time when they were younger than 10, and 18% reported that they did so at the age of 6 or younger. In Denmark, Estonia and Finland, more than 80% of students were younger than 10 when they first browsed the Internet. By contrast, in B-S-J-G (China), the Dominican Republic, Mexico and Peru, at least one in five students was older than 13 when they first used the Internet; and in B-S-J-G (China), more than 5% of 15-year-old students reported that they have never used the Internet (Table III.13.6).

The share of students across OECD countries who reported that they were six years old or younger when they first used the Internet increased by three percentage points between 2012 and 2015 (Figure III.13.2); in Hungary, Iceland, Poland and Uruguay, this proportion increased by more than seven percentage points during the period. Across OECD countries, the share of students who reported that they have never used the Internet remained constant during the period at 0.3% (Table III.13.6). These results indicate that there is still a large disparity in Internet use between students in OECD countries and those in developing partner countries.

Figure III.13.2 ■ **Change between 2012 and 2015 in the share of children who used the Internet when they were six years old or younger**



1. "OECD average-27" includes OECD countries with available data for both PISA 2012 and PISA 2015.
Notes: Only countries and economies with available data for both PISA cycles are shown.
Statistically significant differences between 2012 and 2015 are shown next to country/economy name (see Annex A3).
Countries and economies are ranked in descending order of the percentage of students who started using computers at age 6 or younger in 2015.
Source: OECD, PISA 2012 and PISA 2015 Databases, Table III.13.6.

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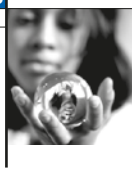


Spending time on line

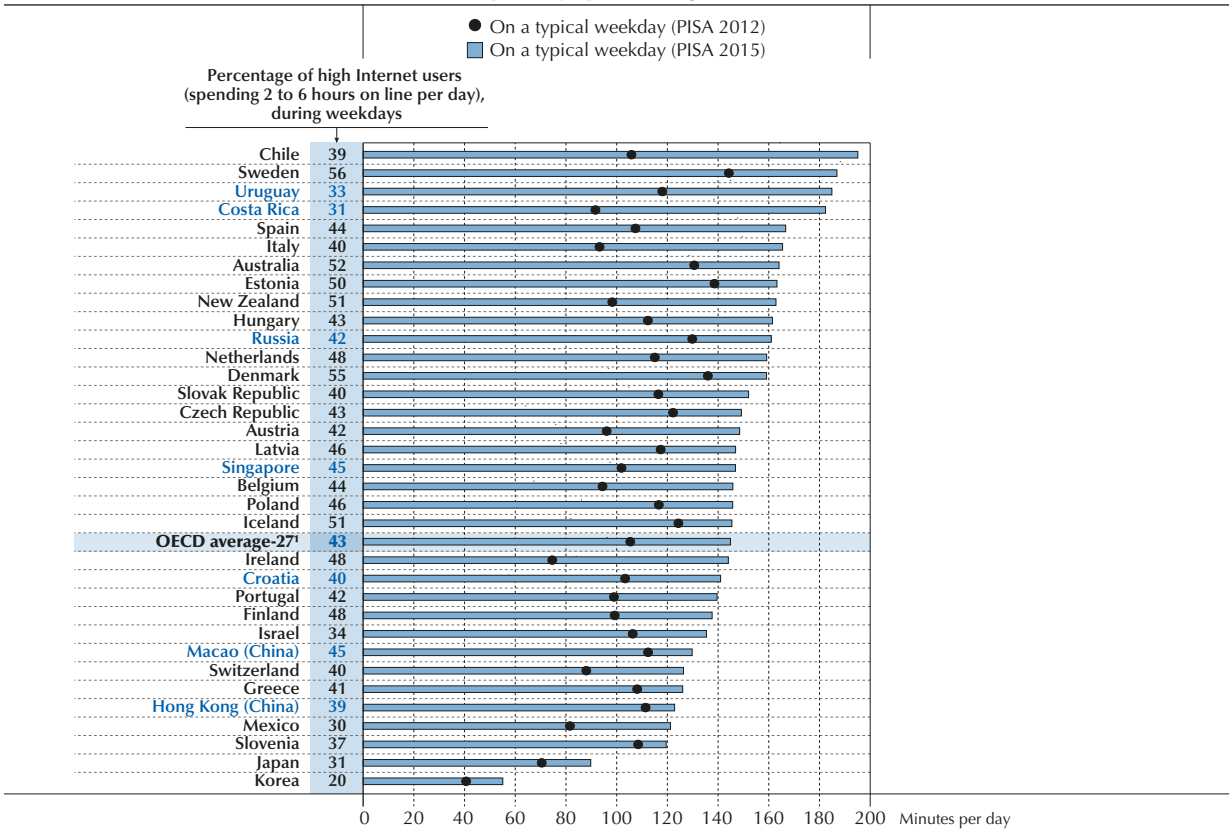
Acquiring proficiency in digital reading and online navigation requires time and practice. The more time students spend practicing these skills, the quicker they become confident and independent players in the digital space. For most teenagers, time spent on line is relatively well balanced with other leisure activities and obligations; for others, the desire to be on line can become problematic.

PISA 2015 asked students how much time they spend using the Internet at home within a typical school week.[1] On average across OECD countries, students reported spending about two hours and 26 minutes per day on line after school on a typical weekday, and more than three hours on line on a typical weekend day (Tables III.3.7 and III.3.8). But there are large differences between countries and economies. In Brazil, Bulgaria, Chile, Costa Rica, Sweden, the United Kingdom and Uruguay, students spend more than three hours on line per typical weekday, while in B-S-J-G (China) and Korea they spend less than one hour on line after school. Students in Bulgaria, Chile, the Netherlands, Spain, Sweden and the United Kingdom reported that they spend at least three and a half hours on line on a typical weekend day, while those in B-S-J-G (China), Korea and Peru reported spending less than two hours on line during a typical weekend day. On average across OECD countries, 26% of students could be considered "extreme Internet users" during weekend days, as they spend more than six hours on line during those days. Some 16% of students can be classified as "extreme Internet users" during weekdays.

In almost all countries and economies, the time spent on line outside of school increased between 2012 and 2015. The OECD average increase was around 40 minutes, on both weekdays and weekends. This increase was largest – by more than one hour and 20 minutes – in Chile and Costa Rica (Figure III.13.3 and Table III.13.9).

Figure III.13.3 ▪ **Change between 2012 and 2015 in time spent on line outside of school**

Minutes per day spent using the Internet



1. "OECD average-27" includes OECD countries with available data for both PISA 2012 and PISA 2015.

Notes: As the answers were given on a categorical scale, it is not possible to compute exactly the average time students spend on line. The numbers in this figure thus report a lower bound for the number of minutes students spend on online activities, whereby the answer "between one and two hours", for instance, is converted into "61 minutes at least".

Only countries and economies with avalailable data for both PISA cycles are shown.

Countries and economies are ranked in descending order of the time per day spent using the Internet in 2015.

Source: OECD, PISA 2012 and 2015 Databases, Tables III.13.7 and III.13.9.

StatLink http://dx.doi.org/10.1787/888933473465

Only in some countries is there a noticeable gender gap in Internet use. In Denmark and Korea, boys spend half an hour more on line than girls outside of school on a typical weekend day, while in Israel, girls spend half an hour more on line than boys during those days. In Denmark and Sweden, the share of boys who could be considered "extreme Internet users" (they use the Internet more than six hours per day) is at least 10 percentage points larger than the share of girls who could be so considered. In B-S-J-G (China) and Korea, girls are 10 to 20 percentage points more likely than boys to be "low Internet users", meaning that they use the Internet for less than one hour during weekend days (Table III.3.8).

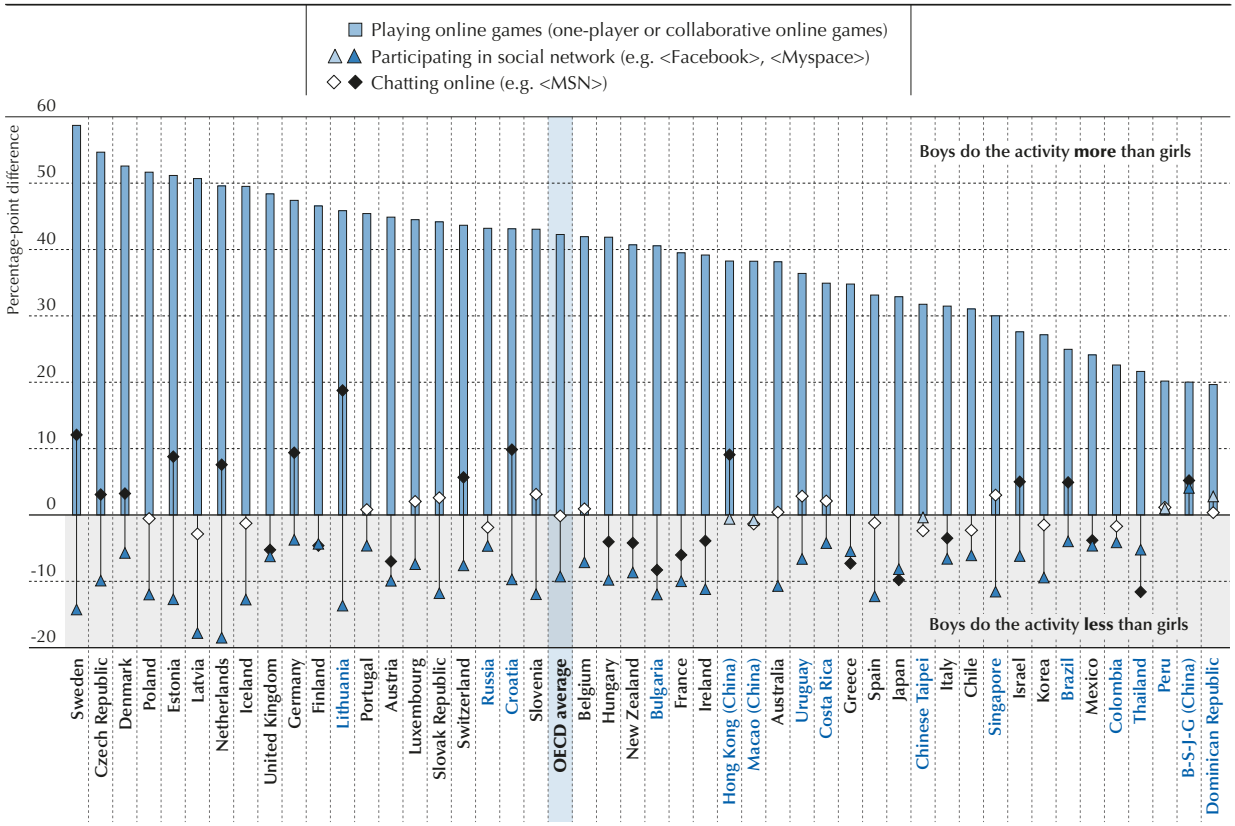
Online activities outside of school

Use of ICT for leisure online activities

What are students doing on line? PISA 2015 asked students whether they use the Internet/chat/social networks before and after school, and how often they engage in online activities, such as playing one-player or collaborative online games, chatting on line or participating in social networks.

Figure III.13.4 ■ **Use of ICT for leisure online activities, by gender**

Difference in the percentages of boys and girls who play online games, chat on line or participate in social networks every day outside of school

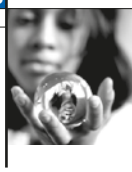


Note: Statistically significant differences are marked in a darker tone. All differences for "playing online games" are statistically significant (see Annex A3).
Countries and economies are ranked in descending order of the difference in the percentages of boys and girls who play online games.
Source: OECD, PISA 2015 Database, Table III.13.13.

StatLink http://dx.doi.org/10.1787/888933473470

Participating in social networks was the most popular online leisure activity across OECD countries, followed by chatting on line. Almost three out of four students reported that they participate in social networks every day or almost every day, and at least three out of five students reported that they chat on line. On average across OECD countries, 34% of students reported that they play online games every day or almost every day, and the same share of students said that they never play online videogames (Table III.13.12).

Between 2012 and 2015, the share of students who reported that they engage in online activity every day or almost every day grew by four percentage points, on average. In 15 out of 35 countries and economies with comparable data



for 2012 and 2015, the share of students who play online videogames, chat on line or participate in social networks outside of school increased over the period. Japan and Korea show an increase of more than 30 percentage points in the share of students engaged in online activities, while in Germany and Israel the share of these students shrank by more than 12 percentage points. On average across OECD countries, the share of students who spend time on online chats and the share of students who play online games increased by around five percentage points (Table III.13.14).

Figure III.13.4 reveals large differences in what boys and girls do on line. Some 85% of boys and 86% of girls reported that they participate in at least one of the three online activities considered (chatting, participating in social networks, playing videogames) almost every day, on average across OECD countries (Table III.13.13). But boys are more likely than girls to play online videogames. In the Czech Republic, Denmark, Estonia, Latvia, Poland and Sweden, at least twice as many boys as girls play online videogames almost every day. Girls are nine percentage points more likely than boys to visit social networking sites, on average across OECD countries; and in Latvia and the Netherlands, this gender gap is almost twice as large as the average. Chatting on line is popular among both boys and girls.

Socio-economic status exerts an additional influence on the choice of online activities. In OECD countries, the share of socio-economically advantaged students who participate daily in any of the three online activities is five percentage points larger than the share of disadvantaged students who do. Disparities in online activities related to socio-economic status are particularly large in Colombia, Mexico and Peru (over 40 percentage points in favour of advantaged students [Table III.13.13]).

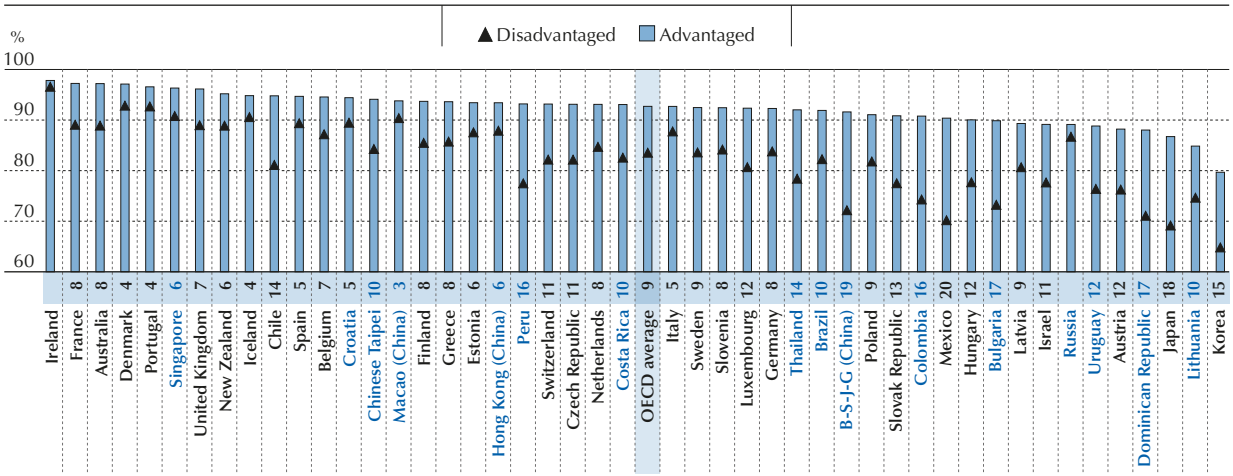
ATTITUDES TOWARDS THE INTERNET

For the first time, PISA 2015 asked students how they feel about the time they spend on line. Across OECD countries, most students agreed that "the Internet is a great resource for obtaining information" (88%) and that "it is very useful to have social networks on the Internet" (84%). Some 67% of students reported that they are excited to discover new digital devices and applications. In Ireland and Denmark, around 95% of students agreed that the Internet is a great resource for obtaining information, while in Japan and Korea, less than 80% of students agreed with this statement (Table III.13.15).

Socio-economically advantaged students are more likely than their disadvantaged peers to think that the Internet is a great resource for obtaining information. In Mexico, the difference between these two groups of students is 20 percentage points, while in B-S-J-G (China), Bulgaria, Colombia, the Dominican Republic, Japan and Peru, more than 15 percentage points separate the two groups. By contrast, in Denmark, Iceland, Macao (China) and Portugal, this gap is narrower than five percentage points (Figure III.13.5).

Figure III.13.5 ■ **Obtaining information from the Internet, by socio-economic status**

Percentage of students who reported they "agree" or "strongly agree" that the Internet is a great resource for obtaining information



Notes: Statistically significant differences between advantaged and disadvantaged students are shown next to country/economy name (see Annex A3).
Advantaged (disadvantaged) students are those in the top (bottom) quarter of the PISA index of economic, social and cultural status (ESCS).
Countries and economies are ranked in descending order of the percentage of advantaged students who think that the Internet is a great resource for obtaining information.
Source: OECD, PISA 2015 Database, Table III.13.16.

StatLink http://dx.doi.org/10.1787/888933473481

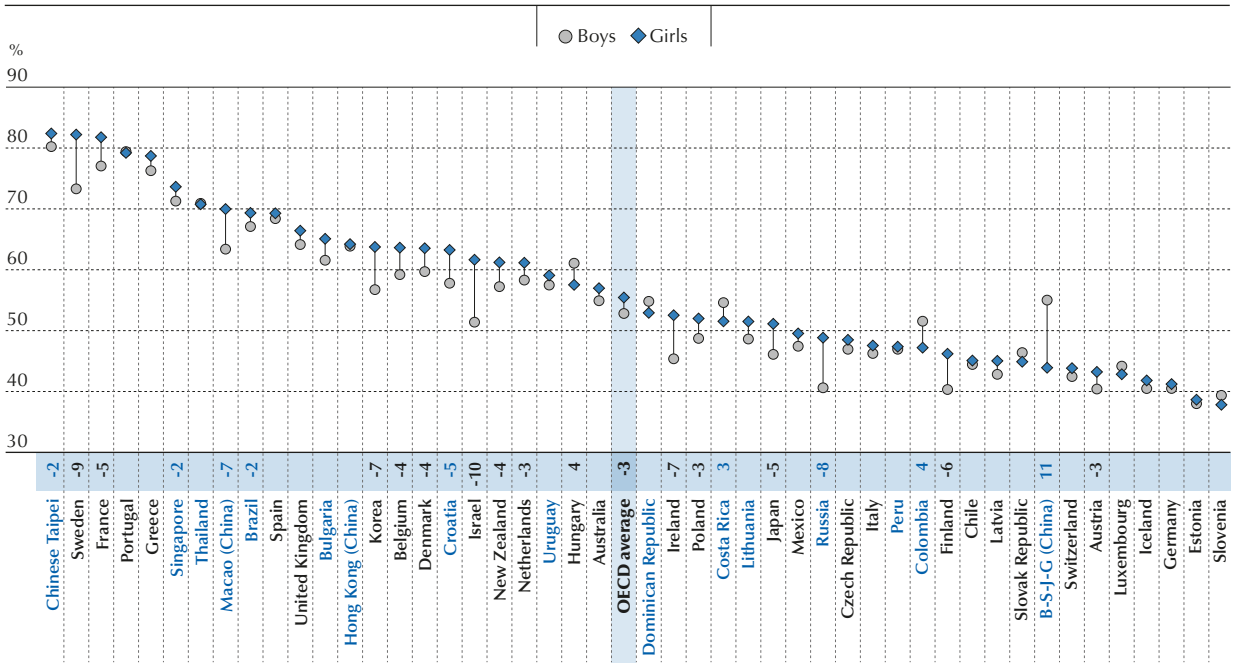
Boys and girls have different attitudes towards the Internet. While boys seem more enthusiastic about new digital devices and applications than girls (11 percentage points more, on average across OECD countries, and 20 percentage points more in the Czech Republic and Denmark), girls are more likely than boys to see the Internet as a useful tool for obtaining information. Girls are also more likely than boys to think that it is useful to participate in social networks on the Internet (Table III.13.16).

PISA 2015 also asked students how they feel when they are engaged in online activities. The data show that most students enjoy using various digital devices and the Internet, but many of them are at risk of problematic Internet use. Across OECD countries, 90% of students enjoy using digital devices and 61% reported that they forget time when using them. More than one in two students (54%) reported that they feel bad if no Internet connection is available. In some countries and economies, the share of students who showed some signs of problematic Internet use is even larger. In France, Greece, Portugal, Sweden and Chinese Taipei, more than 77% of students reported that they feel bad when no Internet connection is available. In Estonia and Slovenia, fewer than two in five students feel badly when they have no access to the Internet (Table III.13.15).

Figure III.13.6 shows that girls are slightly more likely than boys to feel bad when no Internet connection is available, on average across OECD countries. In B-S-J-G (China), boys were 11 percentage points more likely than girls to report that they feel bad when no Internet connection is available, while the opposite gender pattern is observed in Israel, Russia and Sweden. These data suggest that policies promoting the responsible use of the Internet should target both boys and girls.

Figure III.13.6 ■ **Feeling bad if not connected to the Internet, by gender**

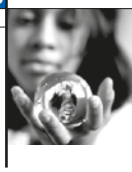
Percentage of students who reported "agree" or "strongly agree"



Note: Statistically significant differences between boys and girls are shown next to country/economy name (see Annex A3).
Countries and economies are ranked in descending order of the percentage of girls who feel bad if there is no Internet connection available.
Source: OECD, PISA 2015 Database, Table III.13.16.

StatLink http://dx.doi.org/10.1787/888933473499

Across OECD countries, 52% of advantaged students and 56% of disadvantaged students reported that they feel bad when no Internet connection is available. In European countries, including Belgium, the Czech Republic, Germany and Slovenia, socio-economically advantaged students were much less likely than disadvantaged students to report that they feel bad without an Internet connection (a difference greater than 12 percentage points). The opposite pattern is observed in those countries where the digital divide in access to the Internet is still wide, such as Colombia, Mexico and Thailand. In high-income countries, advantaged students may have more options for offline activities, or might have more supervision and education about Internet use (Table III.13.16; see Chapter 12).



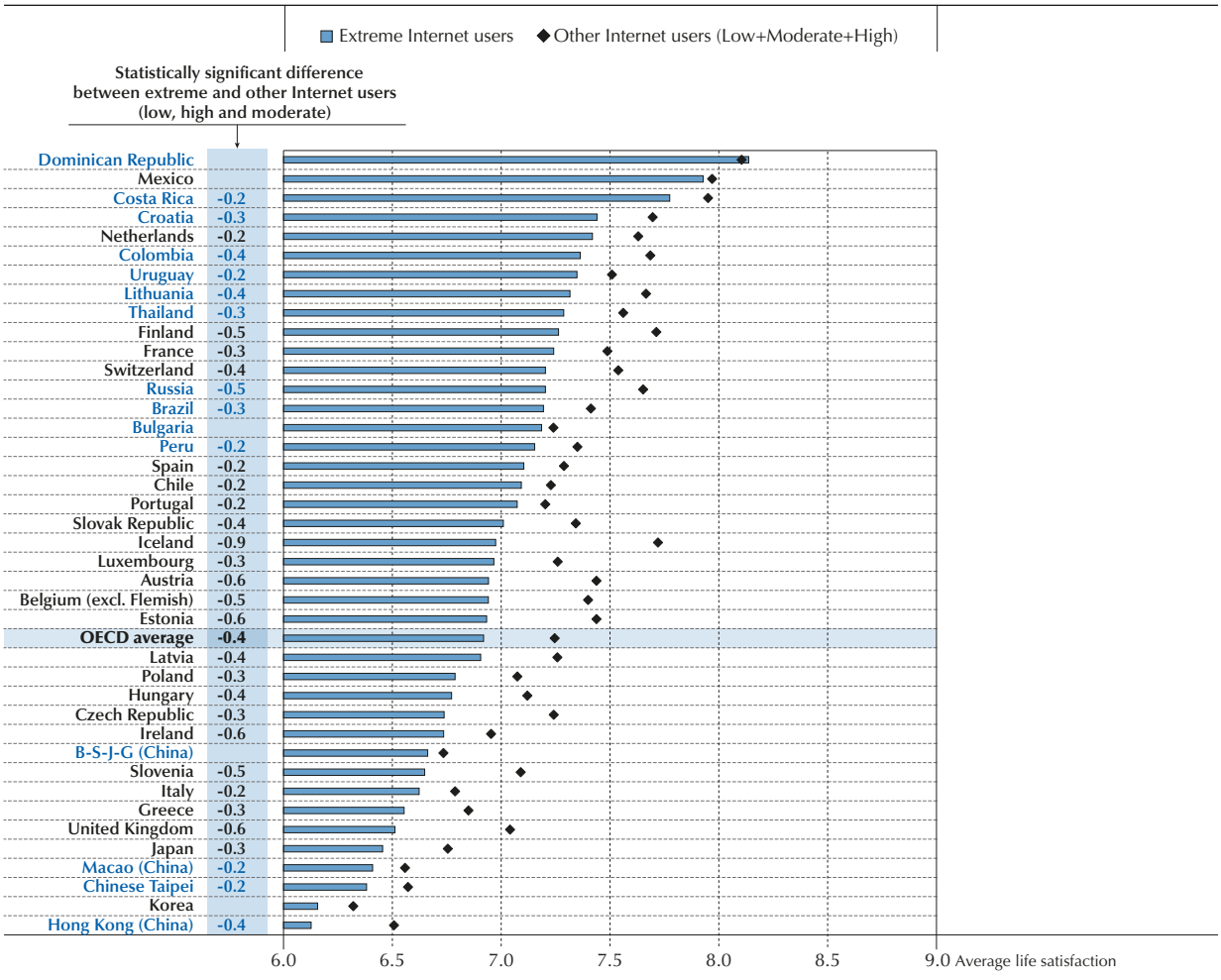
RELATIONSHIP BETWEEN INTERNET USE AND ADOLESCENTS' WELL-BEING

Given the amount of time 15-year-old students spend on the Internet every day, it is crucial to understand whether and how Internet use influences students' well-being. On the one hand, Internet use may increase life satisfaction by providing entertainment and removing logistical obstacles to socialising. On the other hand, online activities pose several risks to well-being. Extensive use of digital media can also undermine students' motivation and concentration, compromising academic achievement (Johnson et al., 2007). Excessive use of the Internet and videogaming could also lead to social isolation (Wood et al., 2004).

Consequences of extreme Internet use on students' social and psychological well-being

In most participating countries and economies, "extreme Internet use" – more than six hours per day – has a negative relationship with students' life satisfaction. PISA 2015 asked students to rate their life satisfaction on a scale from 0 to 10, where 0 means the worst possible life and 10 means the best possible life. Figure III.13.7 shows that across OECD countries, "extreme Internet users" reported themselves as 0.4 point lower on the life satisfaction scale than other Internet users. In Iceland, the difference between these groups is even larger: around 1 point.

Figure III.13.7 ■ **Average life satisfaction, by time spent on the Internet outside of school during weekend days**



Notes: Categories of Internet users are based on students' responses to questions about how much time they spend on line, outside of school, during a typical weekend day. Low Internet users: one hour or less; moderate Internet users: 1 to 2 hours; high Internet users: 2 to 6 hours; extreme Internet users: more than 6 hours.

Statistically significant differences in life satisfaction between extreme Internet users and other Internet users are shown next to the country/economy name (see Annex A3).

Countries and economies are ranked in descending order of the average life satisfaction of extreme Internet users.

Source: OECD, PISA 2015 Database, Table III.13.23.

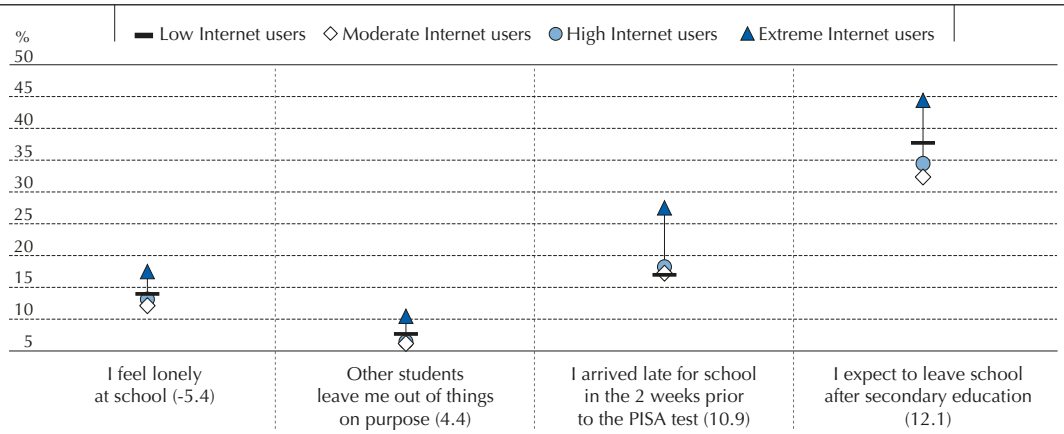
StatLink http://dx.doi.org/10.1787/888933473509

Extreme Internet use is also related to other dimensions of social and psychological well-being (OECD, 2015). Figure III.13.8 shows that, across OECD countries, 17% of "extreme Internet users" feel lonely at school, compared with 14% of "low Internet users" (students who use the Internet less than one hour per day), 12% of "moderate Internet users" (those who spend between one and two hours per day on the Internet) and 13% of "high Internet users" (those who spend between two and six hours per day on the Internet). "Low" and "extreme Internet users" were also more likely than "moderate" or "high Internet users" to report that they are bullied at school.

PISA data also reveal that both "extreme" and "high Internet users" are at greater risk of disengagement from school. One in four "extreme Internet users" reported that they had arrived late for school in the two weeks prior to the PISA test – a share of 11 percentage points larger than the share of "moderate Internet users" who so reported. "Extreme Internet users" were also more likely to report lower expectations of further education than moderate Internet users (Figure III.13.8).

Figure III.13.8 ■ **Well-being outcomes, by time spent on the Internet**

Time spent on the Internet outside of school during weekdays, OECD average



Notes: Categories of Internet users are based on students' responses to questions about how much time they spend on line, outside of school, during a typical weekday. Low Internet users: one hour or less; moderate Internet users: 1 to 2 hours; high Internet users: 2 to 6 hours; extreme Internet users: more than 6 hours.

Statistically significant differences between extreme and moderate Internet users are shown next to the category name (see Annex A3).

Source: OECD, PISA 2015 Database, Tables III.13.19a, III.13.20a, III.13.21 and III.13.22.

StatLink http://dx.doi.org/10.1787/888933473519

ICT use and cognitive well-being

Extreme Internet use is negatively related to academic performance. After accounting for students' socio-economic status, "extreme Internet users" score around 30 points lower than all the other groups of students across all subjects. In some countries, the score-point difference is extremely large. For instance, in B-S-J-G (China), Belgium, France, Switzerland and Chinese Taipei, "extreme Internet users" score 50 points lower in science than other students (Figure III.13.9 and Table III.13.24a).

One possible explanation of the negative relationship between "extreme Internet use" and performance might be that students who spend many hours on line take time away from homework, or get distracted in class because they feel the need to stay connected with their on line friends during school time. But it is also possible that students who spend many hours on line would perform worse even if the Internet did not exist, because they are not interested in their schoolwork, have short attention spans or other reasons.

Table III.13.12 shows that in all countries and economies with available data, except Korea, students who spend more than six hours on line outside of school during weekdays are also more likely to use online chats or e-mail during school hours. On average across OECD countries, 14% of students reported that they chat on line at school every day, and 5% use their e-mail at school every day.

But the use of smartphones and other online communication devices does not necessarily reduce attention spans or discipline. Some studies suggest that smartphones at school could increase students' academic engagement, if they are used for educational purposes (Brooks-Young, 2010; OECD, 2015). Using technologies at school for high-quality educational activities might reduce problems associated with the misuse of the Internet, both in and outside of school.

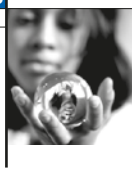
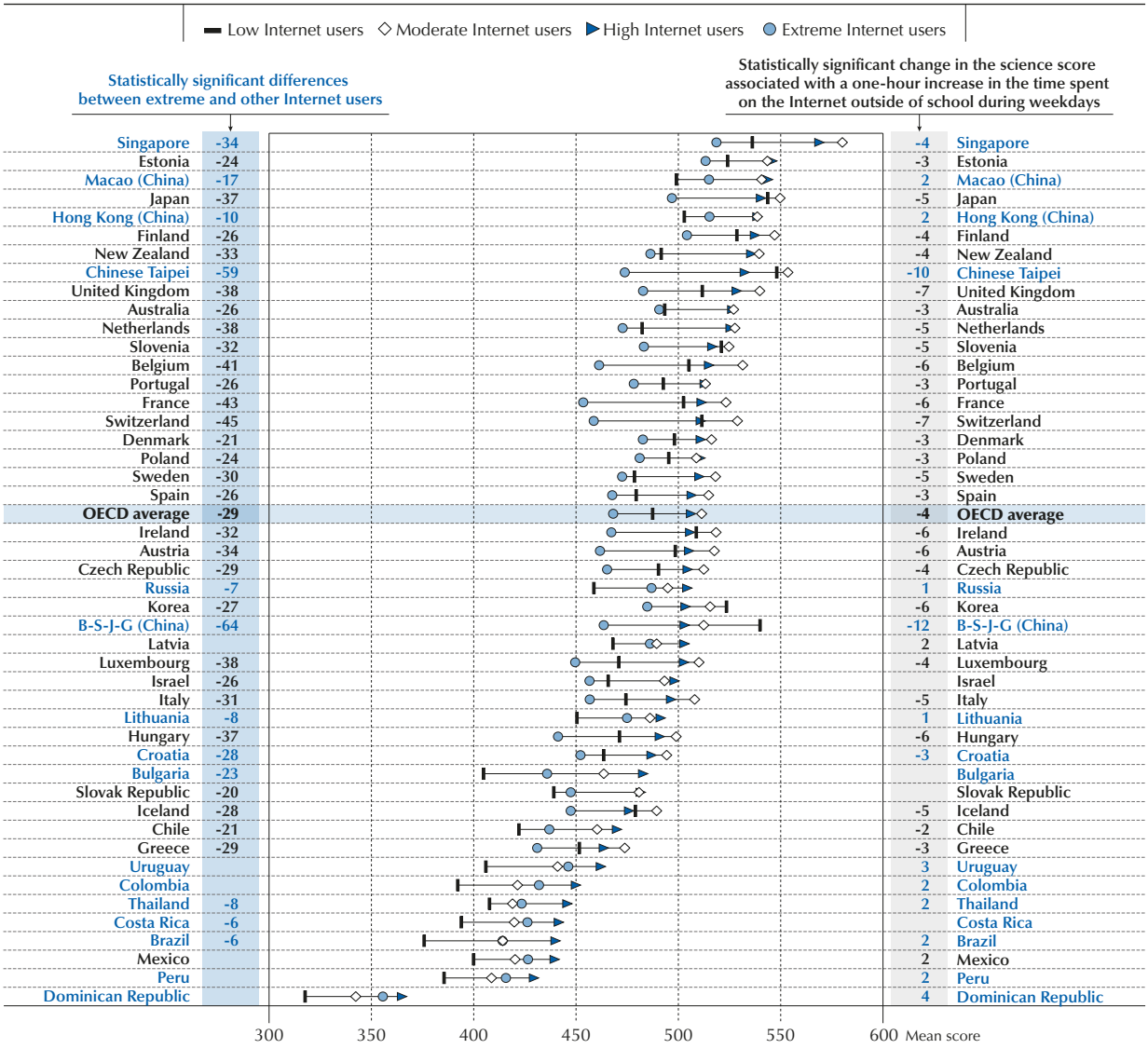


Figure III.13.9 ■ **Science performance, by amount of time spent on the Internet outside of school during weekdays**



Notes: Categories of Internet users are based on students' responses to questions about how much time they spend on line, outside of school, during a typical weekday. Low Internet users: one hour or less; moderate Internet users: 1 to 2 hours; high Internet users: 2 to 6 hours; extreme Internet users: more than 6 hours.

Statistically significant differences between extreme and other Internet users (low, high and moderate), before accounting for students' socio-economis status, are shown next to country/economy name (see Annex A3).

Countries and economies are ranked in descending order of science score among high Internet users.

Source: OECD, PISA 2015 Database, Table III.13.24a.

StatLink http://dx.doi.org/10.1787/888933473521

What these results imply for policy

- Providing access to the Internet and digital devices in schools, and teaching students how to use these tools responsibly and critically, can reduce the impact of the digital divide between advantaged and disadvantaged students.
- School-based prevention and intervention strategies can make everyone aware of the negative consequences of Internet overuse. Parents, teachers and students can work together to establish clear boundaries for responsible Internet use.

Notes

1. As the answers were given on a categorical scale, the average time spent on line is approximated with reference to its lower bound. For example, the answer "between one and two hours" is converted into "at least 61 minutes" (OECD, 2015, pp. 39).

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