

PISA

PISA 2022 Results

Volume III:

Creative Minds, Creative Schools

Factsheets

Germany



Germany

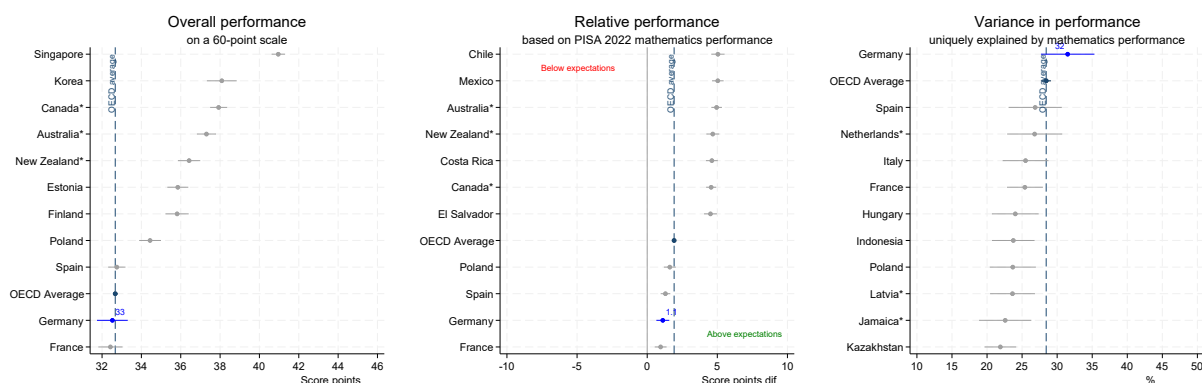
In 2022, the Programme for International Student Assessment (PISA) assessed the creative thinking abilities of 15-year-old students. The test explores how well students can generate diverse and creative ideas, and how well they can evaluate and improve others' ideas to reach creative outcomes. Tasks in the test are situated in four domain contexts: written expression, visual expression, social problem solving and scientific problem solving. [Volume III of PISA 2022 Results](#) gives insights into how well education systems are preparing students to think outside the box and to come up with creative ideas in a range of different contexts. By comparing results internationally, policymakers and educators in Germany can learn from other countries' policies and practices.

How well did 15-year-old students in Germany do on the creative thinking test?

Creative thinking proficiency

Figure 1. PISA 2022 Creative Thinking performance

Germany, OECD average and selected comparison countries/economies



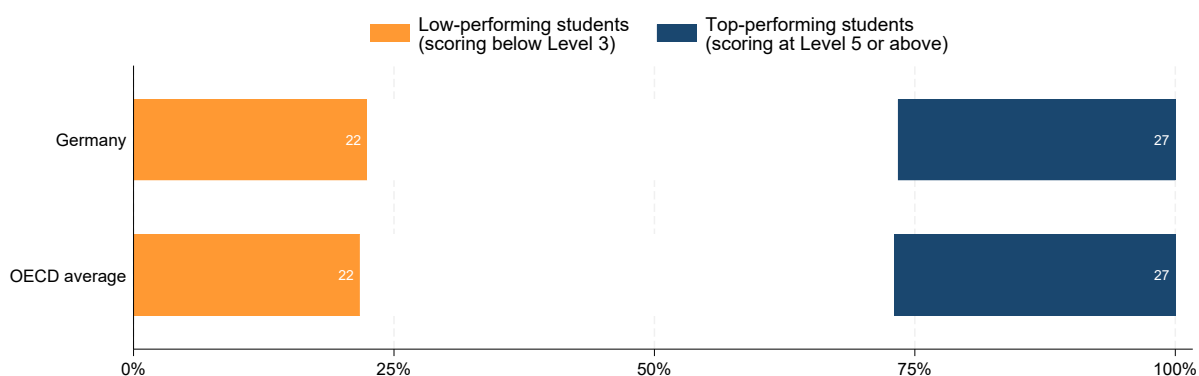
Notes: Comparison countries include the six highest-performing countries (overall and relatively), or the six countries with the smallest share of variance in creative thinking uniquely explained by mathematics performance, and five neighbouring or comparable countries. Horizontal lines that extend beyond the markers represent a measure of uncertainty associated with mean estimates (the 95% confidence interval).

Source: OECD, PISA 2022 Database, Tables III.B1.2.1, III.B1.2.4 and III.B1.2.3.

- With a mean score of 33 out of 60 possible points, students in Germany scored on par with the OECD average in creative thinking (33).
- Students' relative results in creative thinking are above what could be expected from Germany based on their performance in mathematics; and above what could be expected based on their performance in reading.
- In Germany, 32% of the variation in creative thinking performance can be uniquely attributed to variation in mathematics performance, which is not statistically different from the OECD average. Within Germany, the correlation between students' creative thinking and mathematic performance is 0.76, and 0.76 between creative thinking and reading performance (OECD averages: 0.67 and 0.66). For comparison, on average across OECD countries, the correlation between students' mathematics and reading performance is 0.80.

What students can do in creative thinking

Figure 2. Top-performing and low-performing students in creative thinking



Note: Numbers inside the figure correspond to percentages.

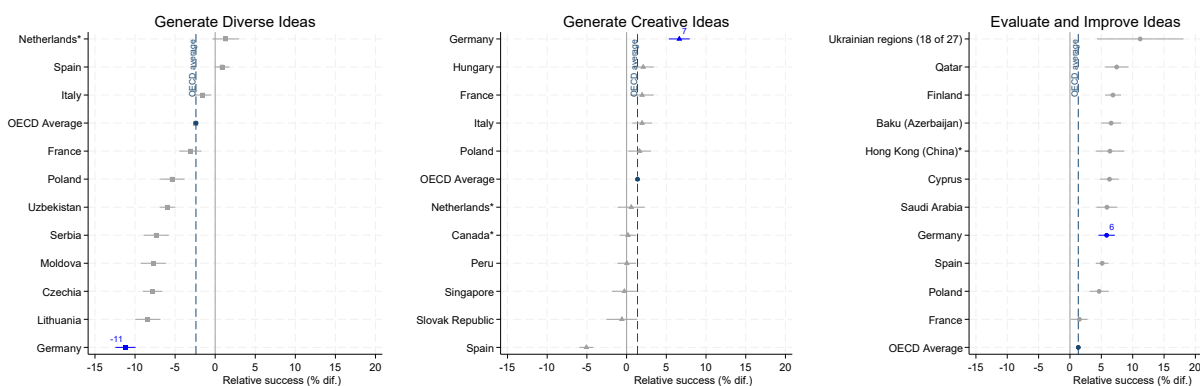
Source: OECD, PISA 2022 Database, Table III.B1.2.2.

- In Germany, 78% of students attained at least a baseline proficiency in creative thinking (Level 3), which is not significantly different from the OECD average (78%). At a minimum, these students can generate appropriate ideas for simple to moderately complex expressive and problem-solving tasks, and they also begin to demonstrate the ability to generate original ideas or solutions in familiar task contexts. In 21 countries and economies out of 64 tested, more than 1 in 2 students did not reach this baseline level of proficiency in creative thinking.
- 27% of students in Germany are *top performers* in creative thinking, meaning that they attained Level 5 or 6 in the PISA Creative Thinking test (OECD average: 27%). In Australia*, Finland, New Zealand*, Canada* and Korea, around 4 in 10 students are top performers, and in Singapore, more than 1 in 2. At these proficiency levels, students can generate, evaluate and improve creative ideas in diverse and complex tasks, including abstract design tasks or more constrained/unfamiliar scientific and social problem scenarios. Only in 20 out of 64 countries and economies taking the PISA 2022 Creative Thinking test can more than 25% of students be considered top performers.
- In Germany, just about 25% of top performers in creative thinking are also top performers in mathematics, and 25% are top performers in reading (OECD averages: 20% and 17%). This suggests that one can excel in creative thinking without excelling in academic domains (and vice-versa), though a baseline level of proficiency in one domain complements proficiency in the others (see Figure III.2.4 in the report).

How does Germany compare across the ideation processes and domain contexts of the creative thinking test?

Figure 3. Relative success across the three ideation processes of the test

Germany, OECD average and selected comparison countries/economies



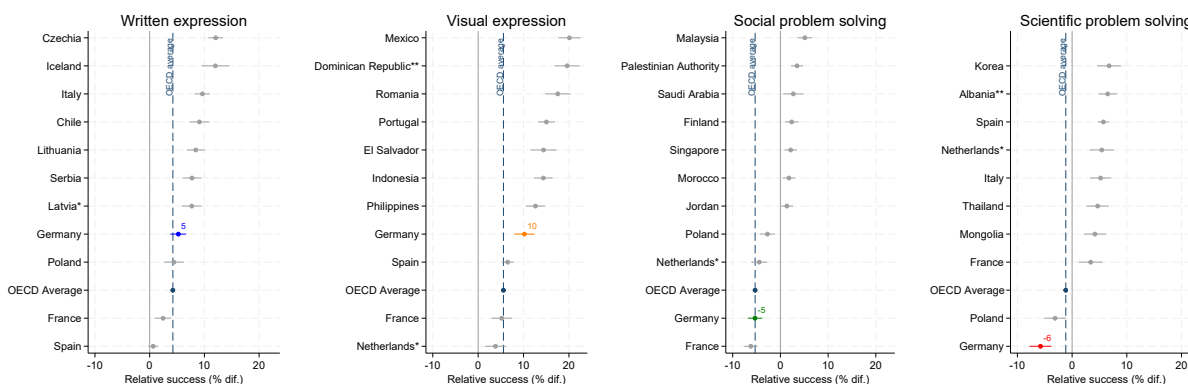
Notes: The relative success is the difference between the percentage of correct responses in one ideation process and average percent correct on all other tasks (full credit only). This difference accounts for the international difficulty of each task. Comparison countries include the six countries with the highest relative performance in each ideation process, and five neighbouring or comparable countries. Horizontal lines that extend beyond the markers represent a measure of uncertainty associated with mean estimates (the 95% confidence interval).

Source: OECD, PISA 2022 Database, Table III.B1.4.3.

- The PISA 2022 Creative Thinking test explored students' proficiency across three ideation processes: generating diverse ideas, generating creative ideas, and evaluating and improving ideas. In light of their overall performance in the test, and accounting for tasks' respective difficulty, students in Germany scored relatively higher in tasks that required generating creative ideas than in others.
- Across all participating countries and economies, students struggled relatively more with tasks that required generating diverse ideas, accounting for their respective difficulty.

Figure 4. Relative success across the four domain contexts of the test

Germany, OECD average and selected comparison countries/economies



Notes: The relative success is the difference between the percentage of correct responses in one domain context and average percent correct on all other tasks (full credit only). This difference accounts for the international difficulty of each task. Comparison countries include the six countries with the highest relative performance in each domain context, and five neighbouring or comparable countries. Horizontal lines that extend beyond the markers represent a measure of uncertainty associated with mean estimates (the 95% confidence interval).

Source: OECD, PISA 2022 Database, [Table III.B1.4.4](#).

- All 32 tasks in the test were also situated in four domain contexts: written expression, visual expression, social problem solving, and scientific problem solving. Relative to their performance in all other tasks, and accounting for their respective difficulty, students in Germany showed higher proficiency in tasks that involved written expression and visual expression.
- Across all participating countries and economies, and accounting for their respective difficulty, students struggled more with tasks that involved solving both social and scientific problems with creative ideas.

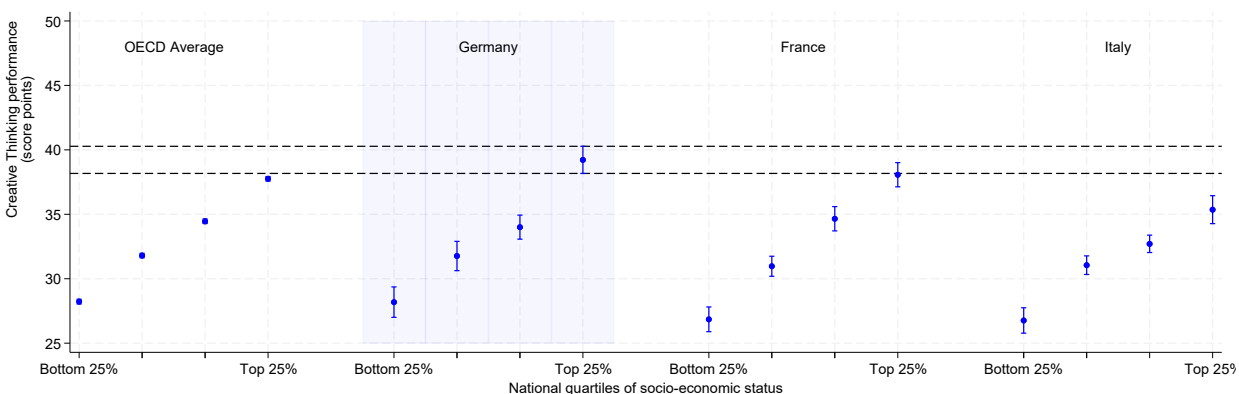
A special edition of PISA

This PISA test was originally due to be conducted in 2021 but was delayed by one year due to the COVID-19 pandemic. The exceptional circumstances throughout this period, including lockdowns and school closures in many countries, led to occasional difficulties in collecting some data. While the vast majority of countries and economies met PISA's technical standards, a small number did not. A country or economy in this note with an asterisk (*) next to its name means that caution is required when interpreting estimates because one or more PISA sampling standards were not reached. Two asterisks (**) means that caution is required when comparing estimates with other countries/economies as a strong linkage to the international PISA creative thinking scale could not be established. Further information can be found in the Reader's Guide and in Annexes A2 and A4 of the main report.

Performance gaps within Germany

Socio-economic divides

Figure 5. Mean performance in creative thinking by national quartiles of socio-economic status



Notes: Vertical bars that extend beyond the markers represent a measure of uncertainty associated with each estimate (the 95% confidence interval). Horizontal, dashed lines represent the uncertainty associated with the mean score of the most advantaged group of students (the top quartiles) within Germany.

Source: OECD, PISA 2022 Database, Table III.B1.3.7.

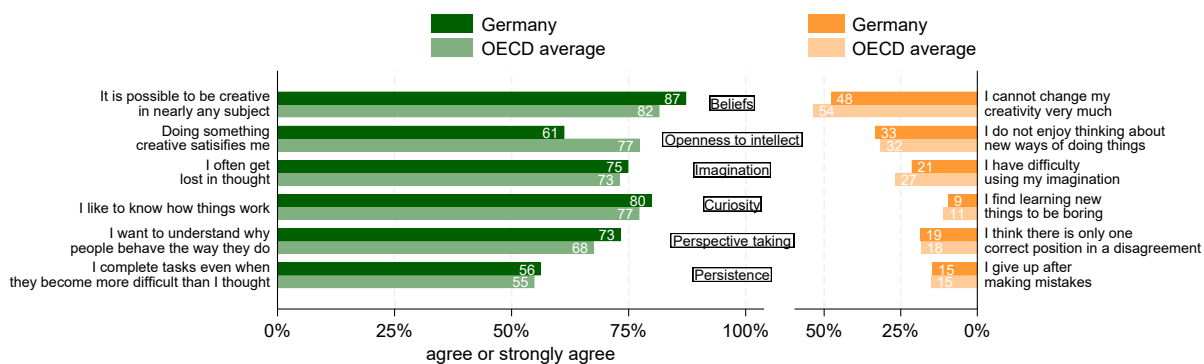
- In Germany, socio-economically advantaged students outperformed disadvantaged students in creative thinking by 11 score points, on a scale that counts 60 points. This is larger than the average difference between the two groups across OECD countries (9.5 score points).
- Like student performance in the mathematics, reading and science assessments, socio-economic status was a strong predictor of performance in creative thinking in all PISA participating countries and economies. It explained 13% of the variation in creative thinking performance in Germany (compared to 12% on average across OECD countries). However, in general, the association between socio-economic status and performance in creative thinking was weaker than the equivalent association with mathematics performance.
- Some 13% of disadvantaged students in Germany were able to score in the top quarter of creative thinking performance within Germany. These students can be considered *resilient* creative thinkers because, despite their socio-economic disadvantage, they have attained excellence in performance by comparison with students in their own country. On average across OECD countries, 13% of disadvantaged students scored in the top quarter of creative thinking performance in their own countries/economies.

Gender gap

- On average, girls outperformed boys in creative thinking by 3.1 score points in Germany. This is on par with the average gender gap across OECD countries (2.7 score points). In no PISA participating country or economy did boys score above girls in creative thinking.
- Within Germany, the gender gap persists towards the top of the distribution, with a score-point difference of 2.9 between high-achieving girls and boys (i.e. those who score at or above the 75th percentile in Germany).
- The share of students attaining Level 5 or 6 in creative thinking (the top performers) in Germany is larger among girls (31%) than among boys (22%) (OECD averages: 31% and 23%). At the other end, the share of students who do not reach the baseline Level 3 is larger among boys (27%) than among girls (18%) (OECD averages: 25% and 18%).

How do students perceive creativity in Germany?

Figure 6. Beliefs, attitudes and social-emotional characteristics that positively relate to creative thinking



Note: Numbers inside the figure correspond to percentages.

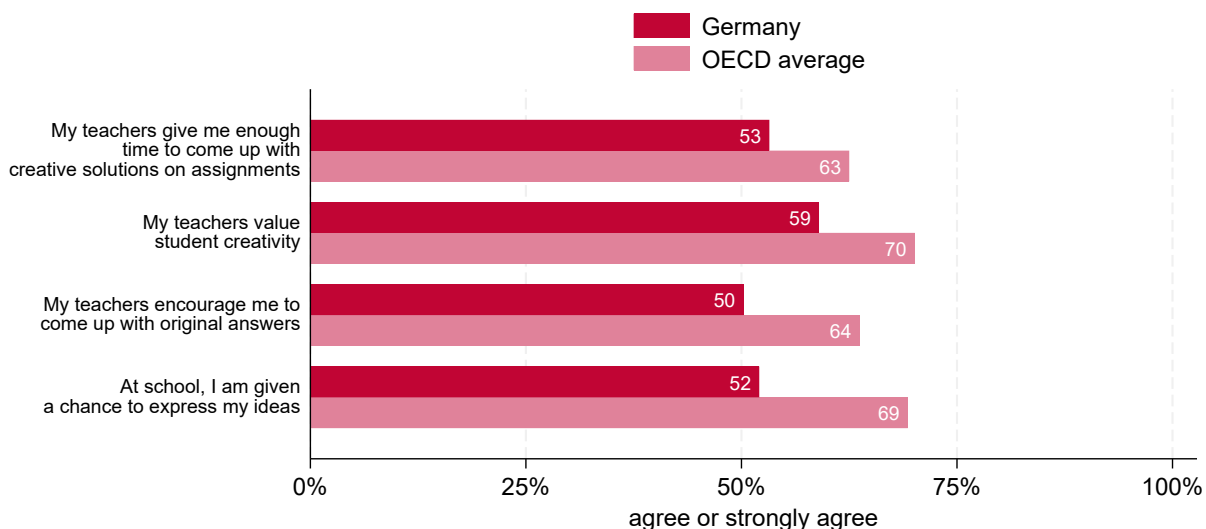
Source: OECD, PISA 2022 Database, Tables III.B1.5.2, III.B1.5.4, III.B1.5.11, III.B1.5.19, III.B1.5.23, III.B1.5.29, and III.B1.5.33.

- In Germany, 87% of students agreed or strongly agreed that it is possible to be creative in nearly any subject, compared to 82% on average across OECD countries. These students outscored those with a narrower view of creativity, by 4.7 points accounting for students' and schools' socio-economic characteristics. Yet, 48% of students in Germany think that their creativity is something about them that they cannot change very much – a “fixed mindset” that is associated with a 0.9-point lower score on average across OECD countries, accounting for the same characteristics.
- In general, students reported relatively high levels of imagination, openness to intellect, and creative self-efficacy. These are attitudes that relate positively to their creative thinking performance, on average across OECD countries. In Germany, 61% of students agreed or strongly agreed that doing something creative satisfies them, while only 21% said they have difficulty using their imagination. The former scored significantly higher than their peers, while the latter scored significantly lower, accounting for students' and schools' characteristics.
- Some social-emotional characteristics, such as curiosity, perspective taking, and persistence, were also identified as distinctive markers of creative thinkers. In Germany, 80% of students like to know how things work, 73% want to understand why people behave the way they do, and 56% complete tasks even when they become more difficult than they thought. Those students performed significantly better on the creative thinking test than their peers with similar socio-economic characteristics.
- In Germany, 49% of 15-year-old students expect to complete at least a higher education degree (ISCED 5 or higher; OECD average: 70%). On average across OECD countries, those students demonstrated a stronger creative thinking proficiency than their peers, even after accounting for their mathematics and reading performance and socio-economic characteristics. Furthermore, 4% of students in Germany expect to work a job in the creative and cultural sectors at 30 years old – while 2% report having a parent working such a job. On average across OECD countries, accounting for gender and socio-economic characteristics, students aspiring to a career in the creative and cultural sectors scored significantly higher than their peers on the creative thinking test, by 1.1 points. For comparison, those who expect to work as managers or professionals outscored their peers by 0.7 points.

How conducive to creativity is the school environment in Germany?

Pedagogies and activities encouraging creative thinking

Figure 7. Pedagogies conducive to creative thinking



Note: Numbers inside the figure correspond to percentages.

Source: OECD, PISA 2022 Database, [Table III.B1.6.1](#).

- In Germany, 53% of students reported that their teachers give them enough time to come up with creative solutions on assignments (OECD average: 63%). Across participating countries and economies, students who said their teachers value student creativity (59% in Germany) are more likely to score well in the creative thinking test, especially on tasks that require evaluating and improving ideas, an ideation process that appears generally more easily amenable than generating diverse or creative ideas.
- Students in Germany also have access to art (94%), drama (51%), creative writing (24%) or computer programming (74%) classes/activities once a week or more at school, according to their school principals; they are attended by respectively 49%, 10%, 15% and 24% of students (OECD averages: 27%, 11%, 16%, and 17%).

Digital activities

- Digitalisation is transforming the social environment of 15-year-old students, at school as well as outside of it. In Germany, 36% of students use digital tools for learning purposes for one hour a day or more at school, and 54% outside of school on a typical weekend day (OECD averages: 55% and 50%). In general, this type of use appears positively but modestly associated with students' performance in creative thinking, up to a certain point – as is the case with their performance in mathematics.
- Using digital tools for leisure purposes, however, plays out differently on students' creative thinking performance. In Germany, 25% of students spend more than one hour a day on digital leisure activities while at *school* (OECD average: 35%). On average across OECD countries, this context and type of use relate negatively to students' creative thinking performance. However, students in Germany who spend more than one hour a day on digital tools for leisure *outside of school*, e.g. on a typical weekend day, scored 4.7 points higher than their peers, accounting for gender and students' and schools' socio-economic profiles. This represents 90% of students in Germany, and 80% on average across OECD countries.

Key features of the PISA 2022 Creative Thinking test

PISA in 2022

- PISA 2022 was implemented in 81 countries and economies. Results for mathematics, reading and science were released on 5 December 2023, and reported in [PISA 2022 Volumes I and II](#) as well as in this [factsheet](#) for Germany.
- For the first time in 2022, 64 countries and economies also implemented the PISA Creative Thinking cognitive test, including Germany. Ten more countries and economies implemented the creative thinking items in the background questionnaires.

The Creative Thinking test

- PISA defines creative thinking as the ability to generate, evaluate and improve ideas to produce original and effective solutions, advance knowledge and create impactful expressions of imagination”.
- The PISA 2022 Creative Thinking test consists of 32 tasks designed to measure three ideation processes: generating diverse ideas, generating creative ideas, and evaluating and improving ideas. It encompasses both divergent and convergent cognitive processes associated with “little-c” creativity; in other words, it measures the types of creative thinking skills that 15-year-old students around the world can reasonably demonstrate in “everyday” contexts.
- The test also aimed to measure different applications of creative thinking, given that the capacity to generate relevant and innovative ideas depends on knowledge and practice in specific domains. The tasks are thus situated in four domain contexts: written expression, visual expression, social problem solving, and scientific problem solving.
- Every task being open-ended, they were essentially infinite ways of demonstrating creative thinking. Scoring for this assessment therefore relied on human judgement following detailed scoring rubrics and well-defined coding procedures. Find more details on the test’s items and coding procedures in Chapter 1, Annex A1, and Annex C of the PISA 2022 Results (Volume III); or have a go at some of the creative thinking tasks [here](#).
- Students, teachers, school principals and parents also answered questions on their beliefs, attitudes and practices related to creativity and creative thinking, as part of the PISA background questionnaires.

The students

- Some 690 000 students took the assessment in 2022, representing about 29 million 15-year-olds in the schools of the 81 participating countries and economies.
- In Germany, 6116 students, in 257 schools, completed the assessment in mathematics, reading or science, representing about 681 400 15-year-old students (an estimated 92% of the total population of 15-year-olds).

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