

IEA COMPASS: BRIEFS IN EDUCATION

GENDERED LEARNING MOTIVATION IN GLOBAL PERSPECTIVE

Findings Based on LaNA, PIRLS, and TIMSS



SUMMARY

Understanding how girls and boys experience reading and mathematics is essential for addressing gender differences in learning motivation and engagement, ideally before the end of primary school. Using data from LaNA (Literacy and Numeracy Assessment) 2023 Linking Study, PIRLS (Progress in International Reading Literacy Study) 2021, and TIMSS (Trends in International Mathematics and Science Study) 2023, this brief looks at enjoyment and perceived competence in reading and mathematics across LaNA countries, as well as lower-middle-income and high-income countries participating in PIRLS and TIMSS.

Our findings show clear patterns in reading: girls report higher enjoyment in nearly all countries, and in lower-income contexts they also tend to report higher perceived reading competence. This pattern appears more consistently in LaNA countries. In mathematics, however, the picture varies: boys in higher-income countries generally report higher enjoyment and perceived competence, whereas in LaNA countries and in TIMSS lower-middle-income countries, these gender gaps are smaller or not visible. The results highlight the need for education systems to monitor motivational indicators alongside test scores to better support learning and gender equality, in line with UN Sustainable Development Goal (SDG) 4, particularly Target 4.5.

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IMPLICATIONS

- ▶ **Treat motivation as an equity signal, not an outcome.** Gender differences in enjoyment and perceived competence persist even when boys and girls perform similarly, suggesting that motivational indicators can highlight forms of inequality that are not captured by test scores alone.
- ▶ **Promote gender-inclusive teaching.** Girls tend to enjoy reading more across contexts, while higher perceived reading competence among girls is more evident in lower-income contexts. In mathematics, boys in high-income countries generally report higher enjoyment and perceived competence. Teachers can use strategies to support the motivation of both girls and boys across the two subjects.
- ▶ **Challenge gender stereotypes.** Generalizations like “reading is for girls” or “mathematics is for boys” are associated with students’ attitudes and align with the gendered patterns in enjoyment and perceived competence observed in this study. Schools and education systems can work to counter these patterns.
- ▶ **Strengthen the monitoring of motivation in diverse contexts.** Patterns in enjoyment and perceived competence can reveal risks that achievement data alone may miss. International assessments, including tools such as LaNA, designed for low- and lower-middle-income countries, can support the identification of gender-related gaps and inform preventive and corrective policies across education systems.

INTRODUCTION

One of the main priorities of the global education agenda is to make sure all children build essential skills in reading and mathematics. SDG 4 focuses on ensuring every child leaves primary school with essential skills, with SDG Target 4.5 specifically calling for the elimination of gender disparities in education by 2030 (UNESCO, 2016). However, gender equity in education is not reflected only in access or achievement but also in how students experience learning, including their enjoyment and confidence in academic subjects.

Most of what we know about gender differences in enjoyment and confidence in reading and mathematics comes from high-income countries (HICs). Studies from these settings consistently show that girls tend to enjoy reading more and feel more confident about it, while boys often show greater interest and confidence in mathematics (OECD, 2021; Campos et al., 2025). These motivational patterns broadly align with achievement patterns: girls tend to perform better in reading, while gender differences in mathematics achievement can vary across contexts and across the performance distribution (Encinas-Martín & Cherian, 2023; Eck et al., 2026). Yet, low- and lower-middle-income countries (LLMICs) are still underrepresented in research on students' attitudes, so it is unclear whether the same gender patterns found in high-income countries also appear in LLMICs, where classroom environments, cultural norms, and teaching practices can look very different. This brief therefore examines whether gender gaps in enjoyment and perceived competence persist after accounting for achievement.

To better understand these patterns, two motivational concepts are particularly useful for examining early gender differences: enjoyment and perceived competence. Enjoyment refers to how much students like a subject and feel emotionally engaged with it, while perceived competence reflects whether students feel capable and believe they usually do well (Eccles & Wigfield,

2002; Pekrun, 2006). Together, these concepts capture aspects of learning that test scores alone cannot.

To examine whether these gender patterns also appear in low- and lower-middle-income countries, we use data from three IEA assessments: LaNA 2023 Linking Study, PIRLS 2021, and TIMSS 2023. LaNA was designed for low- and lower-middle-income contexts to measure foundational learning using assessments grounded in and linked to PIRLS and TIMSS (von Davier et al., 2025; IEA, n.d.-b.). PIRLS assesses reading literacy at the primary level, while TIMSS assesses mathematics achievement in primary and lower secondary education (IEA, n.d.-a). This allows us to compare gender patterns across three groups: LaNA countries (all of which are LLMICs), additional lower-middle-income countries (LMICs), and high-income countries (HICs) participating in PIRLS and TIMSS, where gender patterns are already well documented. We also examine whether observed gender gaps reflect differences in achievement or broader differences in students' self-beliefs.

The study is guided by the following questions:

1. How do gender patterns in enjoyment and perceived competence in lower-income countries, shown separately for LaNA low- and middle-income countries (LLMICs) and for PIRLS/TIMSS lower-middle-income countries (LMICs), compare with those in high-income countries (HICs)?
2. To what extent can gender differences in enjoyment and perceived competence be explained by differences in achievement?

By providing comparative evidence from diverse education systems, this brief contributes to a more inclusive understanding of gender equity in emerging learning and highlights the importance of monitoring motivational outcomes in addition to achievement outcomes.

DATA & ANALYSIS

This brief draws on student questionnaire and achievement data from three large international assessments conducted by IEA: LaNA 2023 Linking Study, PIRLS 2021, and TIMSS 2023. LaNA provides comparable information from six LLMICs (Burkina Faso, Egypt, Pakistan, Nigeria, Palestine, and Senegal) and is grounded in and linked to PIRLS and TIMSS, allowing meaningful comparison across diverse contexts. LaNA follows IEA's established international procedures for sampling and implementation, including the same two-stage sampling approach as in PIRLS and TIMSS (Savaşçı-Smith et al., 2025). PIRLS and TIMSS contribute additional data from both LMICs and HICs, allowing comparisons between LaNA countries and a broader set of education systems at different income levels.

To compare patterns across country income groups, all countries participating in LaNA, TIMSS (grade 4), and PIRLS were classified

according to the World Bank income classifications available at the time of the analysis (World Bank, 2025). For clarity, we distinguish three groups.

1. LLMICs (LaNA only): LaNA countries include six low- and lower-middle-income countries (LLMICs) that participated in LaNA comprising one low-income country (Burkina Faso) and five lower-middle-income countries.
2. LMICs (PIRLS/TIMSS): Lower-middle-income countries (LMICs) refer to countries classified as lower-middle-income that participated in PIRLS and/or TIMSS. No low-income countries participated in these assessments.
3. HICs (PIRLS/TIMSS): High-income countries (HICs) refer to countries classified as high income that participated in PIRLS and/or TIMSS.

In the following sections, we refer to these groups as LLMICs (LaNA only), LMICs (PIRLS/TIMSS), and HICs (PIRLS/TIMSS).

Across all datasets, four core constructs were examined: enjoyment of reading or mathematics, and perceived competence ("doing well") in reading or mathematics. Each construct was measured using harmonized single-item indicators (e.g., "I enjoy reading" and "I usually do well in mathematics") with a four-point agreement scale. Responses were reverse-coded so that higher values represented more positive attitudes and were treated as approximately continuous in the analyses.

The analysis followed a two-step approach. First, separate linear regressions accounting for the complex sample design were estimated for each country to assess gender gaps in the four affective outcomes: enjoying mathematics, enjoying reading, perceived competence in mathematics and perceived competence in reading, while controlling for student achievement. Second, the estimated gender gaps were summarized across countries to identify broader affective patterns across country groups. Achievement gender gaps were examined separately to provide descriptive context for the observed patterns.

RESULTS & DISCUSSION

Figures 1 and 2 below reveal clear, domain-specific patterns in gender differences across countries. These differences are consistent in reading but vary more across income groups in mathematics. Figure 3 summarizes the overall patterns across country income groups and motivational constructs.

► Reading Motivation

Figure 1 shows gender differences in both reading enjoyment and perceived reading competence after controlling for reading achievement. The most consistent pattern is observed for reading enjoyment: in most countries and country groups, girls report higher enjoyment of reading than boys. This pattern is consistent across all income groups, although the magnitude and statistical significance of the gaps vary across contexts. In PIRLS HICs, the majority of countries display statistically significant gaps favoring girls, with only a few exceptions. Two Gulf countries stand out with higher enjoyment among boys; however, this difference is statistically significant only in Saudi Arabia.

Gender differences in perceived reading competence are more varied. In PIRLS HICs, gaps are generally small and often not statistically significant, with some countries showing modest female advantages and others slight male advantages. PIRLS LMICs show very small and often non-significant differences at the country level, although the pooled results suggest a slight female advantage for this group. In LaNA countries, girls tend to report higher perceived competence in reading than boys, and a few of these gaps are statistically significant. Overall, perceived reading competence displays moderate gender differences that vary considerably across contexts, with the clearest female advantages observed in LaNA countries.

► Mathematics Motivation

A contrasting pattern emerges in mathematics (Figure 2). In TIMSS HICs, boys report higher enjoyment of learning mathematics in almost every system, and in most countries these differences are statistically significant. Saudi Arabia shows the most pronounced male advantage. In TIMSS LMICs, gender differences are minimal and not statistically significant.

In LaNA countries, gender gaps in mathematics enjoyment are smaller, inconsistent, and mostly non-significant, with Egypt being the only case showing a clear female advantage. Overall,

boys tend to report higher enjoyment of mathematics primarily in high-income contexts, while both LaNA countries and TIMSS LMICs show little to no systematic gender difference.

Gender differences in perceived mathematical competence show an even stronger contrast. The right panel of Figure 2 highlights the largest gender gaps in TIMSS HICs, where boys report substantially higher perceived competence in mathematics in nearly all countries. These effects are highly consistent across systems, with only Kuwait and Romania showing no significant difference.

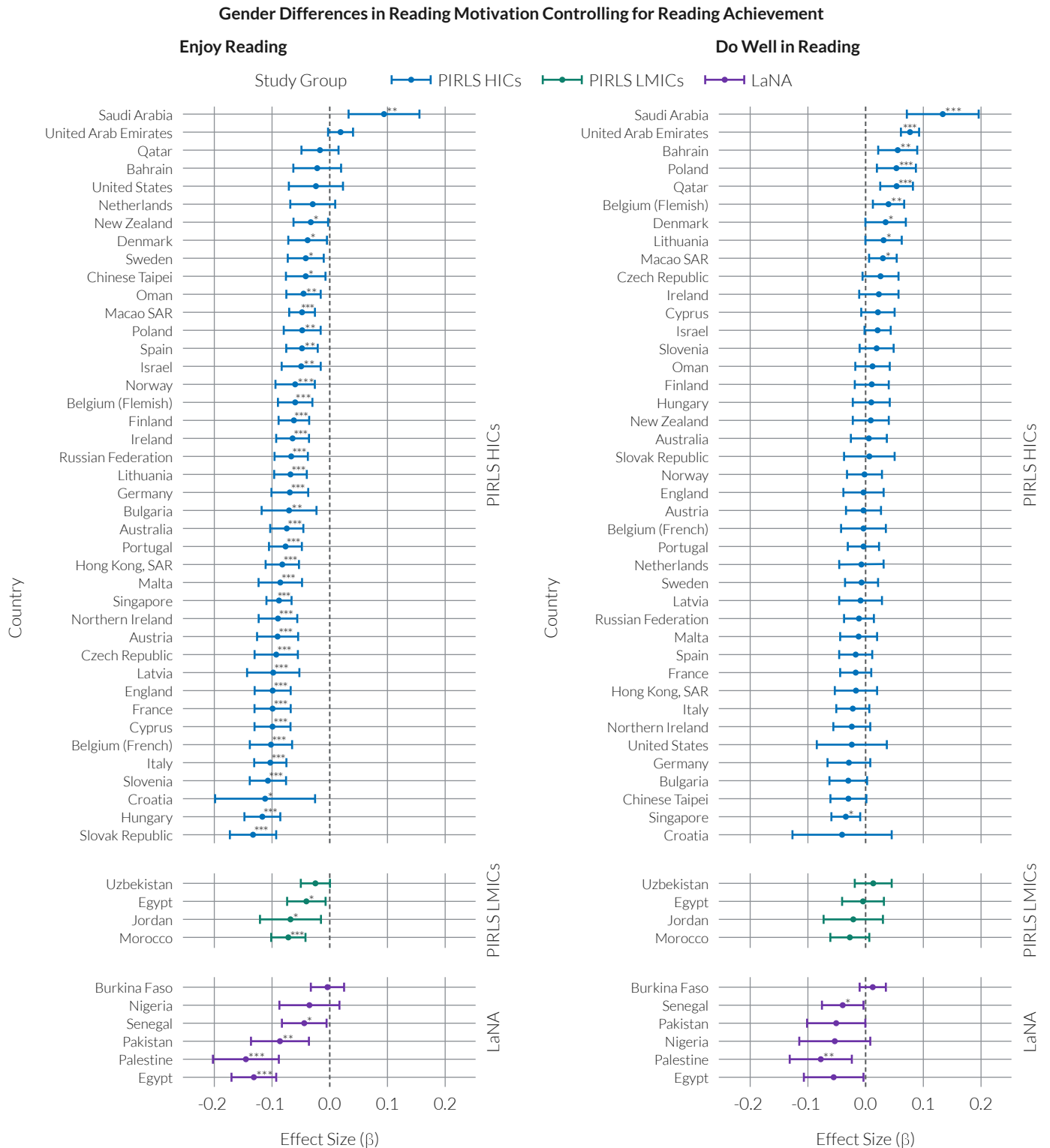
In TIMSS LMICs, gender differences are consistently small and statistically non-significant. In LaNA countries, the pattern is less uniform. Burkina Faso shows a significant male advantage, while the other systems show no statistically significant gender differences. Overall, strong male advantages in perceived mathematical competence appear primarily in high-income systems rather than as a universal pattern.

The meta-analytic results (Figure 3) show the same overall pattern: reading displays the most consistent trend, with girls reporting higher enjoyment of reading across all country groups and a smaller female advantage in perceived reading competence in the PIRLS LMIC and LaNA countries, whereas male advantages in mathematics motivation appear mainly in high-income countries.

A comparison with gender differences in achievement suggests that motivational and achievement patterns are related, although the strength of the relationship varies across domains. They align in reading, where girls outperform boys by around 25 points in lower-income countries and 15 points in HICs, while also reporting higher enjoyment across all country groups. In lower-income countries, differences in mathematics achievement are small (around 6 points in favor of girls) and correspond to similarly small motivational gaps. However, the relationship is less proportional in HIC mathematics, where boys' modest achievement advantage (14 points) is accompanied by the largest motivational gaps observed in the study.

Overall, the findings highlight that gender differences in learning motivation are strongly context-dependent and cannot be explained solely by differences in academic achievement.

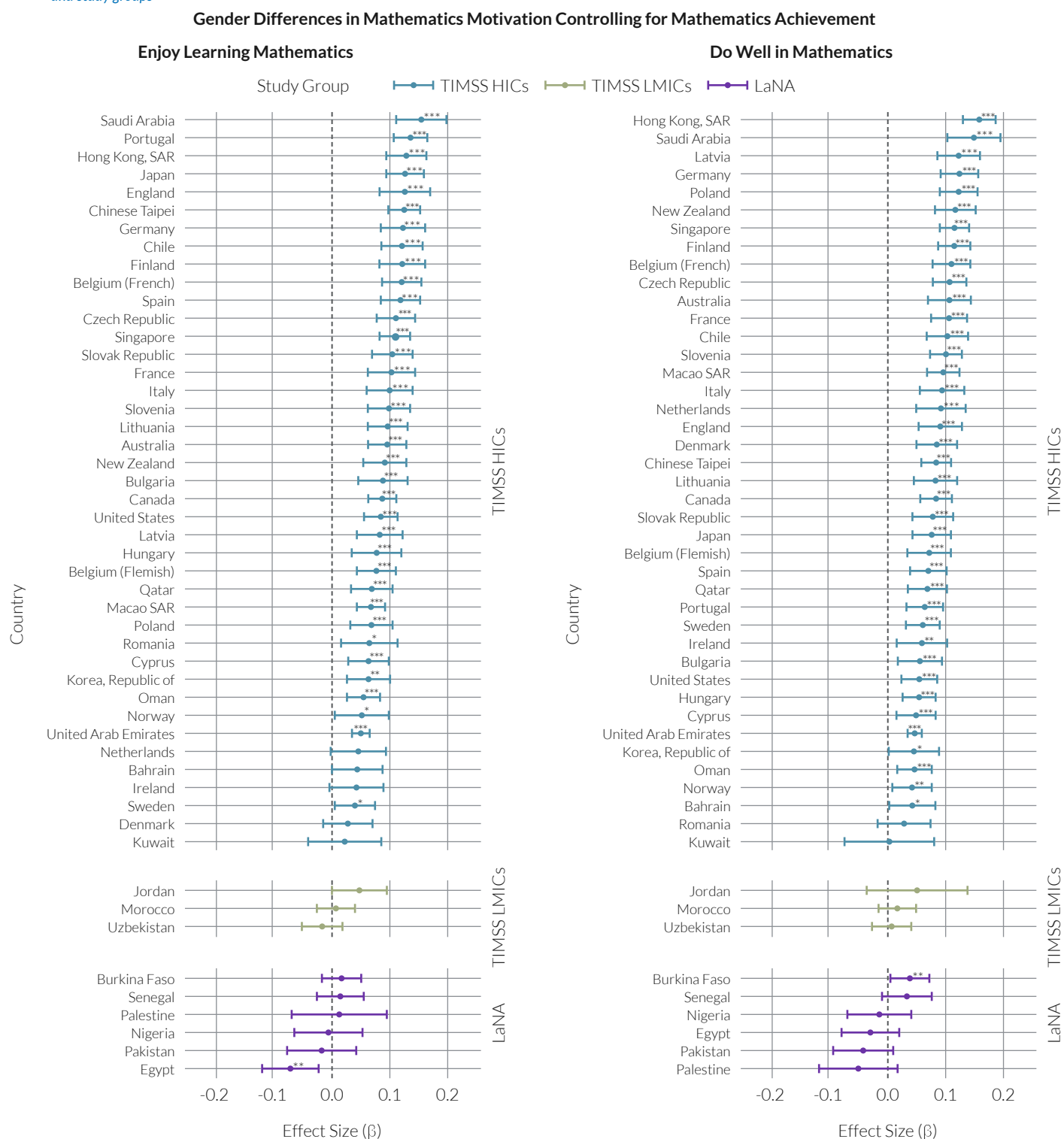
Figure 1. Gender differences in reading motivation and perceived reading competence after controlling for reading achievement across countries and study groups



Study Groups: PIRLS HICs, PIRLS LMICs, and LaNA countries.

The left panel shows gender differences in enjoyment of reading, and the right panel shows gender differences in perceived reading competence. Dots represent estimated gender gaps after controlling for achievement. Negative values indicate higher scores among girls, whereas positive values indicate higher scores among boys. Horizontal lines show 95 percent confidence intervals. Asterisks indicate statistically significant gender differences (* $p < .05$, ** $p < .01$, *** $p < .001$).

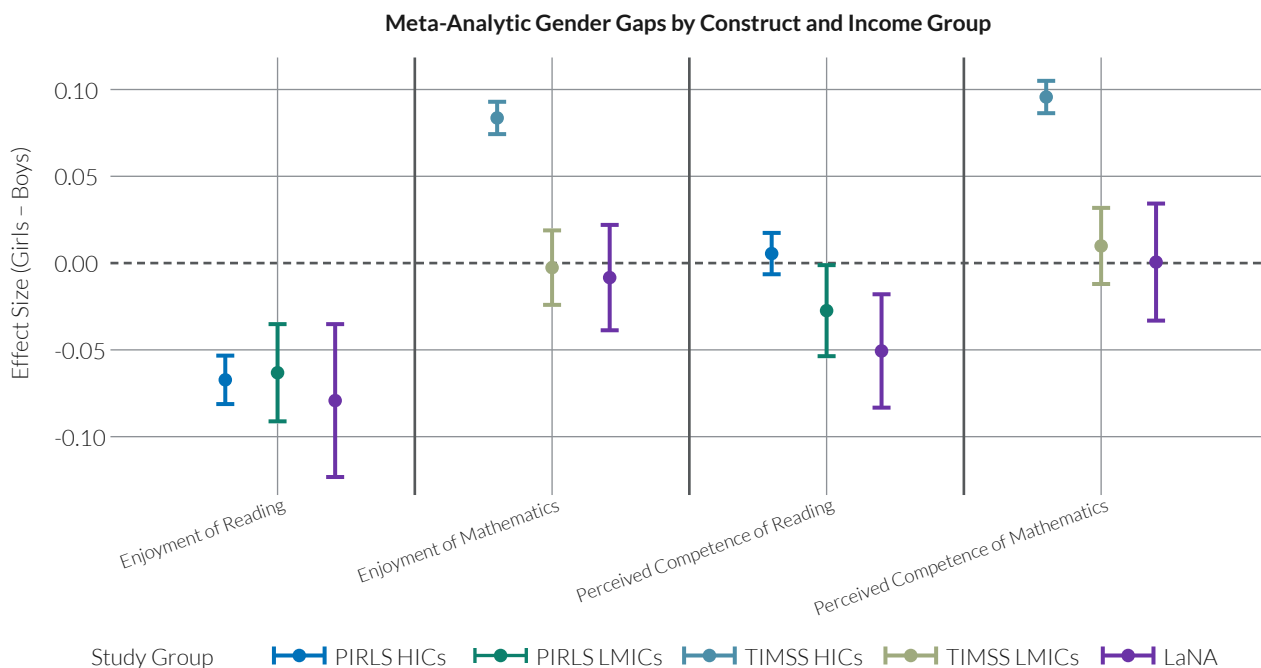
Figure 2. Gender differences in mathematics motivation and perceived mathematical competence after controlling for mathematics achievement across countries and study groups



Study Groups: TIMSS HICs, TIMSS LMICs, and LaNA countries.

The left panel shows gender differences in enjoyment of mathematics, and the right panel shows gender differences in perceived mathematical competence. Dots represent estimated gender gaps after controlling for achievement. Negative values indicate higher scores among girls, whereas positive values indicate higher scores among boys. Horizontal lines show 95 percent confidence intervals. Asterisks indicate statistically significant gender differences (* $p < .05$, ** $p < .01$, *** $p < .001$).

Figure 3. Meta-analytic gender gaps in reading and mathematics motivation across country income groups



Estimates are shown separately for PIRLS HICs, PIRLS LMICs, LaNA countries, TIMSS HICs, and TIMSS LMICs. Negative values indicate higher scores among girls, whereas positive values indicate higher scores among boys. Points represent pooled meta-analytic gender gaps for each country income group, and vertical lines indicate 95 percent confidence intervals.

CONCLUSION & BROADER IMPLICATIONS

This brief examined gender differences in enjoyment and perceived competence in reading and mathematics across three groups of education systems: LaNA countries (all low- and lower-middle-income), and lower-middle and high-income countries participating in PIRLS and TIMSS. Together, these comparisons shed new light on how boys and girls experience learning at the end of primary school across diverse economic contexts.

Across nearly all countries, girls reported higher enjoyment of reading than boys. Gender differences in perceived reading competence were smaller overall, but girls tended to report higher perceived reading competence in lower-income contexts, with the clearest pattern observed in LaNA countries. Taken together, these findings indicate a widespread gender gap in reading motivation and perceived competence, although its magnitude varies across contexts. In mathematics, a different picture emerges. In most of the high-income countries, boys reported higher enjoyment and perceived competence, whereas in many lower-income countries these gender gaps are smaller and often not statistically significant. This contrast indicates that gendered motivational patterns are not universal and vary across social, cultural, and educational contexts. Importantly, gender gaps in enjoyment and perceived competence remain largely unchanged after accounting for achievement, and they do not fully match the gender gaps in achievement. This suggests that differences in enjoyment and perceived competence cannot be fully explained by test performance alone and may also be shaped by broader social and cultural influences.

Together, these findings underscore the value of complementing achievement data with information on students' enjoyment and perceived competence to better understand gendered learning experiences and inform policy decisions. Motivational outcomes should be considered central components of educational equity rather than secondary outcomes of achievement. Monitoring enjoyment and confidence can help education systems identify emerging gender disparities earlier than achievement alone.

The findings also highlight the importance of gender-inclusive teaching that responds to each country's unique context. In high-income countries, this might involve strengthening girls' confidence in mathematics and boys' engagement with reading, while lower-income countries may pay particular attention to gender differences in enjoyment and perceived competence in line with their education system priorities and progress.

Challenging everyday gender stereotypes, like the idea that "reading is for girls" or "mathematics is for boys," may help create healthier learning environments in which all students feel motivated. In addition, tracking students' enjoyment and confidence through national and international monitoring systems, including assessments like LaNA, can support countries in identifying gender gaps and designing policies that advance progress toward SDG 4, particularly Target 4.5.

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