Gender, Income, and Numeracy Test Scores

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Key points

- In our research, we identify early-life socioeconomic status as a key influence in girls' numeracy test scores.
- Girls from the most disadvantaged background where mother is not in labour force or has lower education levels show disproportionally lower numeracy test scores.
- Our research suggests a need for gender and income targeted policies as early as possible in child's schooling.

1. Introduction

Lower educational achievement has significant and long-lasting social and economic consequences all through life. Hence, it is important to identify why educational performance gaps between students occur and how they evolve as a child progresses through schooling. Research has established that numeracy test scores are lower for girls than boys and that they are lower for students from lower socio-economic background than for those from higher socio-economics status. In the research using data from the Longitudinal Survey of Australian Children (LSAC), we show that socioeconomic gaps based on early-life household income and gender are significant drivers of numeracy in Australia. Our research expands on this by investigating whether —and how— gender and socio-economic status interact in affecting numeracy test scores. Do girls and boys from lower socio-economic background experience similar disadvantage? Or is the penalty (or advantage) imposed by socio-economic background different for girls and boys? We show that as well as having separate effects, gender and socioeconomic background interact resulting in a significant double-disadvantage for girls from poorer households.

Test scores from standardised tests are commonly used as a measure of academic performance. While this measure has its own strengths and limitations, it enables comparison across student

groups over time. We focus on numeracy gaps, a skill that is increasingly important in the labour market, and, in particular, we explore girls' disadvantage in this critical domain. Rendall and Rendall (2014) shows that wage premium for occupations with high maths requirement has been growing. While there is overall underrepresentation of women in STEM, it is particularly concentrated in the math-intensive fields (Kahn and Ginther, 2017).

2. Summary of results

We find that between Grades 3 to 9, boys have a distinct advantage in numeracy scores over girls, which widens over time. This gender gap is not explained by early childhood numeracy or literacy, contemporaneous household characteristics, or school types. By Grade 9, poorer female students are doubly disadvantaged. This disadvantage arises because the effect of a lower socioeconomic background on test scores is significant only for girls. Belonging to a bottom income decile household leads to a penalty for girls, but not for boys. In our base estimations, approximately one-third of the gender gap in Grade 9 is explained by early household income. We also find that mother's education and labour force status play an important role in the emergence of gender gaps, at both ends (top/bottom) of the income distribution. At the top of the income distribution, a high level of mother's education almost results in gender parity. In contrast, for boys, test scores increase with stay-at-home mothers at the top of the income distribution with limited effect at the bottom and none in the middle.

3. Conclusion

Our research demonstrates the double disadvantage, recognising it, is a first step towards addressing it. Our results also suggest the way forward for addressing these gaps: who should be the focus of efforts for closing numeracy gaps, when is the most effective time to intervene towards closing the gaps and how to close numeracy gaps? Girls from lower socio-economic status need to be the prime focus for numeracy skills development and should be supported by policies and programs designed to lift numeracy skills. Our results provide early suggestive evidence for the potential of gender-specific policies. More specifically, labour market role models have a positive correlation with higher numeracy scores for girls, while for boys (parental-) time resources have shown a positive correlation. In terms of timing, early years matter. Numeracy skills attainted in grade 3 and socio-economic status at that early age explain the majority of numeracy gaps in grade 9. This provides guidance for "when" interventions should be targeted; interventions at early grades will be most effective and have cumulative effects.

References

Kahn, Shulamit, and Donna Ginther. 2017. “Women and STEM.” National Bureau of Economic Research, Inc NBER Working Papers 23525.

Rendall, Andrew, and Michelle Rendall. 2014. “Math Matters: Student Ability, College Majors, and Wage Inequality.” Department of Economics, University of Zurich Working Papers.

Inclusions

Parasnis, J, Paterson, M and Rendall, M. 2022. 'Gender, Income, and Numeracy Test Scores'. London, Centre for Economic Policy Research.

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