

Math test score gap between white and non-white students in Brazil due to complex factors

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Mary Paula Arends-Kuenning Credit: Marianne Stein

School test scores often show gaps in performance between white and non-white students. Understanding the complex reasons behind this can help reduce those gaps and promote social equality, explains Mary Paula

Arends-Kuenning, associate professor of agricultural and consumer economics at the University of Illinois.

Arends-Kuenning is co-author of a study that analyzes math test scores for 9th-grade students in Brazil and breaks down the characteristics associated with performance gaps between different racial groups.

"The purpose of the study is to gain a better understanding of why there's a gap between black students and white students in Brazil, in order to inform policies to narrow that gap," she says.

Arends-Kuenning and co-author Kalinca Leia Becker, who served as a visiting Fulbright Junior Faculty Scholar at U of I, analyzed various factors that might influence the performance gap. This allowed them to estimate the effect of socio-economic characteristics such as [parental education](#) and standard of living and school characteristics such as quality of education. The gap still remaining after accounting for these factors may be due to [racial discrimination](#) and stereotypes, Arends-Kuenning says.

A unique contribution of this paper is to perform a decomposition (break-down) of factors that influence performance gaps at different test score levels rather than just looking at averages.

The researchers found that for students with test scores in the lower and middle range, the performance gaps can largely be associated with socio-economic factors; however, for higher-scoring students, structural factors that might be attributed to discrimination and stereotypes play a greater role.

Understanding the complexity of how various factors interact can help inform policy interventions, Arends-Kuenning explains.

"For example, we know that parents' education has a big effect on student performance in school. One reason blacks might do worse in school than whites is that the [black students](#) have parents who have lower levels of education than the parents of [white students](#).

"But we can also look at how those characteristics are rewarded in the school. It might be the case that having a parent with a high school education has more of an impact on your achievement if you're white than it does if you're black. And that could be due to many factors, but one factor might be discrimination. Something is blunting the effect of the education on the students' performance for different racial groups."

The researchers used test data from the Brazilian National Evaluation System of Basic Education (SAEB), which is conducted biannually at public schools for 5th-, 9th-, and 11th-grade students. SAEB measures cognitive ability, and also collects information about student and family characteristics.

They analyzed math scores from 2015 for students in 9th grade, which is the last year of middle school in Brazil. They compared results from white, brown (mixed-race), black, and indigenous students. The racial distribution of the Brazilian population is 42% white, 48% brown, 9.3% black, and 0.5% indigenous.

The study looked at four groups of variables that might influence results. Those included characteristics of the student, such as age and gender; family characteristics, such as parental education level and standard of living; classroom characteristics, such as size, racial composition, and teacher attributes; and school characteristics, such as infrastructure and the principal's gender and race.

"This paper is innovative because it looks at differences in performance not just on average, but across the entire distribution, at the 10th, 50th

and 90th percentile," Arends-Kuenning says.

The study showed that for scores in the lower and middle percentiles, student performance gaps can mostly be explained by differences in socio-economic and school characteristics, such as parents' educational level and education quality.

"However, when you get to the upper end of the distribution, we find that the performance gap is also influenced by other factors, which might include discrimination and stereotype threat; that is, how students are treated in school," Arends-Kuenning says.

The study's results indicate that it's important to invest in education, not just for the current generation of students. When those students grow up and raise families, it will affect their children too. That's especially important for students who are at the lower end of the performance distribution.

"For the high-performing students, other interventions are needed," Arends-Kuenning explains. "The first step is to being aware that there is discrimination, and help students understand that it might be affecting why they are not doing well on standardized tests. The next step is to establish a policy to help students confront stereotype threat."

More information: Kalinca Léia Becker et al, Analysis of Math Test Score Gap Between White and Non-White Students in Brazilian Public Schools: SAEB 2015, *The Review of Black Political Economy* (2019). [DOI: 10.1177/0034644619879381](https://doi.org/10.1177/0034644619879381)

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