PACE

COMMENTARY

Science Test Score Gaps by Gender and Race/Ethnicity in Elementary and Middle School

Trends and Predictors

AUTHORS

North Cooc | University of Texas at Austin

David M. Quinn | University of Minnesota

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Since the 1950s, leaders in education, science, politics, and business have stressed the need for "scientific literacy" among the U.S. general public (DeBoer, 2000). Today, concern over scientific literacy is growing due to the increasing demand for graduates entering careers in science, technology, engineering, and math (STEM). In the coming decades, science occupations are predicted to grow faster than the average rate for all fields (Lacey & Wright, 2009), and a significant amount of science and math training will be required for 9 of the 10 fastest growing occupations requiring a bachelor's degree or higher (Wang, 2013).

Developing a more scientifically literate citizenry will require confronting the persistent gender and racial/ethnic gaps in science proficiency (National Center for Education Statistics, 2012). Yet researchers and policymakers tend to focus on math and literacy gaps. Studies that do examine science gaps often concern postsecondary education or high school, neglecting students' early foundational experiences.

In this study, we used nationally representative data from the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 to: 1) describe national trends in science test score gaps by gender and race/ethnicity from Grade 3 to Grade 8, and 2) determine the extent to which Grade 8 science gaps could be explained by socioeconomic status (SES), prior math and reading achievement, and differences in school-, teacher-, and classroom-level factors.

In grade 3, we found large Black-White and Hispanic-White science test score gaps and smaller Asian-White and gender gaps. While the Black-White gap remained fairly constant over time (grade 8: -1.10 *sd*, or equivalent to the distance between the 50th percentile of a normal distribution and the 14th percentile), the Hispanic-White gap narrowed (grade 8: -.65*sd*, or the distance between the 50th percentile of a normal distribution and the 26th) and the Asian-White gap had disappeared by eighth grade. The narrowing of the gender gap from grade 3 to grade 8 was small and marginally significant (grade 8: -.19 *sd*, or 50th percentile of a normal distribution to 42nd).

With our parsimonious set of controls, all eighth grade science gaps were greatly reduced and no longer statistically significant. The gender gap in science appears to be closely related to the gender gap in math, as fifth grade math achievement explains the entire eighth grade female-male science gap. When controlling for fifth grade math and reading achievement, SES, and science classroom, the gender gap, the Black-White gap, and the Hispanic-White gap in grade eight are no longer statistically significant.

The urgency of developing a scientifically literate citizenry stems from the demands of living in a high-tech and global economy (DeBoer, 2000; Muller et al., 2001), and science achievement gaps raise concerns about equity, efficiency, and the nation's future. Our findings indicate that the "leaky" science pipeline may begin as early as third grade, suggesting that interventions aimed at closing gaps should begin when students are young.

The results of our explanatory analyses suggest areas of potentially fruitful future research into the causal roles that prior math and reading skills, school quality, teacher quality, and curriculum may play in expanding or closing science achievement gaps. Such research could eventually result in an understanding of the malleable factors that can be manipulated so as to equalize opportunity within the scientific fields.

The full study can be found in Quinn, David M., and North Cooc. (2015). "Science Achievement Gaps by Gender and Race/Ethnicity in Elementary and Middle School: Trends and Predictors." Educational Researcher, 44(6): 336-346. doi: 10.3102/0013189X15598539.

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Policy Analysis for California Education

Stanford Graduate School of Education
520 Galvez Mall, Suite 444
Stanford, CA 94305
Phone: 650.576.8484

edpolicyinca.org