

# Unintended consequences: More high school math, science linked to more dropouts

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As math and science requirements for high school graduation have become more rigorous, dropout rates across the United States have risen, according to research at Washington University in St. Louis. The tougher requirements appear to have had a major effect on high school graduation rates of Hispanic and African-American males. Credit: Robert Boston

As U.S. high schools beef up math and science requirements for graduation, researchers at Washington University in St. Louis have found that more rigorous academics drive some students to drop out.

The research team reported in the June/July issue of the journal *Educational Researcher* that policies increasing the number of required high school math and science courses are linked to higher dropout rates.

"There's been a movement to make education in the United States compare more favorably to education in the rest of the world, and part of that has involved increasing math and science graduation requirements," explained first author Andrew D. Plunk, PhD, a postdoctoral research fellow in the Department of Psychiatry at Washington University School of Medicine.

"There was an expectation that this was going to be good for [students](#), but the evidence from our analyses suggests that many students ended up dropping out when school was made harder for them," he added.

Studying census data going back to 1990, the researchers showed that the U.S. dropout rate rose to a high of 11.4 percent when students were required to take six math and science courses, compared with 8.6 percent for students who needed fewer math and science courses to graduate. Results also varied by gender, race and ethnicity with the dropout rate for some groups increasing by as much as 5 percentage points.

Plunk and his colleagues studied census data that tracks educational attainment. The researchers compared the performance of students in states with more rigorous math and science requirements to students in states where these requirements were less stringent.

"As graduation requirements were strengthened, high school dropout rates increased across the whole population," Plunk said. "But African-Americans and Hispanics were especially affected. I think our findings highlight the need to anticipate there may be unintended consequences, especially when there are broad mandates that, in effect, make high

school coursework harder."

The researchers looked at student outcomes in 44 states where more stringent graduation requirements went into effect during the 1980s and 1990s. They used the data to examine how factors such as sex, race, ethnicity and moving from state to state, together with the tougher requirements, influenced educational attainment.

Among Hispanic males, the dropout rate increased 2.5 percentage points, and among African-American males, the rate rose by 2 points. The overall dropout rate for African-American males was 19 percent on average. But for young African-American males who went to schools in states with the most stringent math and science graduation requirements, the dropout rate rose to 23 percent.

Co-author William F. Tate, PhD, dean of the Graduate School of Arts & Sciences and vice provost for graduate education, said that part of the problem with adding math and science courses to requirements for high school graduation was that a significant number of students weren't prepared to meet the new requirements.

"Many students were ill-prepared for the tougher standards," said Tate, the Edward Mallinckrodt Distinguished University Professor in Arts & Sciences. "Going forward, state policymakers must understand that students can't take more math and science courses if they quit school."

Plunk explained that as a health researcher, he is interested in the effects that higher dropout rates have on public health.

"High school education is very highly correlated with health outcomes," he said. "Individuals who drop out of high school report more health problems and lower quality of life. Higher dropout rates also can strain the welfare system, which can affect people's health."

In addition to measuring dropout rates, the researchers analyzed the effects of math and science graduation requirements on college enrollment and on the likelihood that students would earn college degrees. They found mixed results.

As would be expected, the more high school dropouts, the lower the rate of college enrollment. But among those who did finish high school and go to college, there was good news, particularly for Hispanic students whose families didn't move frequently to new states or school districts.

"If their families didn't move frequently and they attended schools with tougher [math](#) and science requirements, the likelihood that Hispanic males would earn a college degree of some kind increased more than 6.3 percentage points," Plunk said. "For Hispanic females, there was an increase of just over 5.3 points."

Plunk said the study shows that a "one-size-fits-all" approach to educational requirements is not ideal because the effect on various demographic groups, states and school districts is likely to be very different.

What's certain, he explained, is that when educational policies produce an unintended consequence like larger numbers of dropouts, the effects of those policies reverberate far beyond the classroom.

"Communities with higher dropout rates tend to have increased crime," Plunk said. "Murders are more common. In fact, a previous study estimated that a 1 percent reduction in the country's [high school](#) dropout rate could result in 400 fewer murders and 8,000 fewer assaults per year. Unfortunately, our finding of a 1 percent increase in the [dropout rate](#) suggests we are going in the wrong direction."

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