

Think again about gender gap in science

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Scholars from diverse fields have long proposed that interlocking factors such as cognitive abilities, discrimination and interests may cause more women than men to leave the science, technology, engineering and mathematics (STEM) pipeline after entering college.

Now a new Northwestern University analysis has poked holes in the much referenced "leaky pipeline" metaphor.

The research shows that the bachelor's-to-Ph.D. pipeline in science and engineering fields no longer leaks more [women](#) than men as it did in the past.

The researchers used data from two large nationally representative research samples to reconstruct a 30-year portrait of how bachelor's-to-Ph.D. persistence rates for men and women have changed in the United States since the 1970s. For this study, the term STEM persistence rate refers to the proportion of students who earned a Ph.D. in a particular STEM field (e.g. engineering) among students who had earlier received bachelor's degrees in that same field.

They were particularly surprised that the gender persistence gap completely closed in pSTEM fields (physical science, technology, engineering and mathematics)—the fields in which women are most underrepresented.

Among students earning pSTEM bachelor's degrees in the 1970s, men were 1.6 to 1.7 times as likely as women to later earn a pSTEM Ph.D.

However, this gap completely closed by the 1990s.

Men still outnumber women by approximately three to one among pSTEM Ph.D. earners. But those differences in representation are not explained by differences in persistence from the bachelor's to Ph.D. degree, said David Miller, an advanced doctoral student in psychology at Northwestern and lead author of the study.

"Our analysis shows that women are overcoming any potential gender biases that may exist in graduate school or undergraduate mentoring about pursuing graduate school," Miller said. "In fact, the percentage of women among pSTEM degree earners is now higher at the Ph.D. level than at the bachelor's, 27 percent versus 25 percent."

Jonathan Wai, a Duke University Talent Identification Program research scientist and co-author of the study, said a narrowing of [gender gaps](#) makes sense given increased efforts to promote gender diversity in science and engineering.

"But a complete closing of the gap was unexpected, especially given recent evidence of gender bias in science mentoring," Wai said.

Consequently, the widely used leaky pipeline metaphor is a dated description of gender differences in postsecondary STEM education, Wai added.

Other research shows that gaps in persistence rates are also small to nonexistent past the Ph.D., Miller said.

"For instance, in physical science and engineering fields, male and female Ph.D. holders are equally likely to earn assistant professorships and academic tenure," Miller said.

The leaky pipeline metaphor is inaccurate for nearly all postsecondary pathways in STEM, Miller said, with two important exceptions.

"The Ph.D.-to-assistant-professor pipeline leaks more women than men in life science and economics," he said. "Differences in those fields are large and important."

The implications of the research, Miller said, are important in guiding research, resources and strategies to explain and change gender imbalances in science.

"The leaking pipeline metaphor could potentially direct thought and resources away from other strategies that could more potently increase women's representation in STEM," he said.

For instance, plugging leaks in the pipeline from the beginning of college to the bachelor's degree would fail to substantially increase women's representation among U.S. undergraduates in the pSTEM fields, Miller said.

Of concern, women's representation among pSTEM bachelor's degrees has been decreasing during the past decade, Miller noted. "Our analyses indicate that women's representation at the Ph.D. level is starting to follow suit by declining for the first time in over 40 years," he said.

"This recent decline at the Ph.D. level could likely mean that women's progress at the assistant professor level might also slow down or reverse in future years, so these trends will need to be watched closely," Wai said.

While the researchers are encouraged that gender gaps in doctoral persistence have closed, they stressed that accurately assessing and changing [gender](#) biases in science should remain an important goal for

educators and policy makers.

More information: The study, "The Bachelor's to Ph.D. STEM Pipeline No Longer Leaks More Women Than Men: A 30-Year Analysis," will be published in *Frontiers in Psychology*.

Provided by Northwestern University

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