More underrepresented students obtain science degrees and pursue STEM, due to research mentoring

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Graduation rates among science majors at a large minority-serving college have nearly tripled since the implementation of an undergraduate research experience (URE) program ten years ago. A new study in the *Journal of Research in Science Teaching* indicates that undergraduates who participate in mentored research not only graduate more often with science degrees, but also attend graduate school and pursue STEM careers at higher rates.

Established in 2006, John Jay College's Program for Research Initiatives in Science and Math (PRISM) is an URE program that enables undergraduates to carry out guided scientific research. Although undergraduate STEM research has been de rigueur at major research universities, public Minority- and Hispanic-serving institutions like John Jay have historically struggled to provide their students with equivalent experiences and to keep them competitive with their majority peers. Tailored to students and faculty, PRISM has benefited both participants and the college. An extensive case study revealed that graduation rates from science have nearly tripled since PRISM's inception, that the number of students pursuing graduate degrees has grown nearly ten fold, and that students receive author credit on journal articles more often than at other institutions. Furthermore, John Jay has seen a growth in both external funding and in full-time faculty focused on STEM research.

To reach these conclusions, researchers made use of institutional and program data collected over three years, interviews and focus groups, and surveys. Notably, the study found that PRISM positively affected students' decisions to pursue graduate degrees and STEM careers, impacting Black and Hispanic participants more significantly than their White and Asian counterparts. Lead author Anthony Carpi, Professor of Environmental Toxicology and Dean of Research at John Jay College, City University of New York, said, "We were delighted to see the impact that undergraduate research experiences have on our students' career plans. John Jay has a robust and diverse pipeline of students moving on to post-graduate professional careers in STEM fields, and it is exciting to see these students becoming skilled scientists."

Norman Lederman, Distinguished Professor of Mathematics and Science at the Illinois Institute of Technology, said, "It has long been known that actual research experiences in science and mathematics impact students' attitudes toward science and mathematics as well as the STEM career aspirations of pre-college and college students. It has also been known that under represented students tend to select themselves out of STEM fields for a variety of social and cultural reasons. The PRISM program at John Jay College has produced extremely compelling results and it serves as an impressive model for other universities, especially those that do not initially have high-level research profiles."

This study represents the initial stage of a multi-pronged evaluation of John Jay's URE program with subsequent phases focusing on quantitative comparisons. For now, PRISM appears not only to redress some of the education and employment inequities faced by minority students, but also to serve as an example to other institutions that wish to send more underrepresented students into the STEM workforce.

More information: Anthony Carpi et al, Cultivating minority scientists: Undergraduate research increases self-efficacy and career

ambitions for underrepresented students in STEM, *Journal of Research in Science Teaching* (2016). DOI: 10.1002/tea.21341