

# **The STEM Pipeline: The Role of Summer Research Experience in Minority Students' Graduate Aspirations**

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Practical research experience has been seen as an important tool to enhance learning in STEM (i.e., science, technology, engineering and mathematics) fields and shape commitment to science careers. Indeed, this was a prominent recommendation of the Boyer Commission twenty-years ago that urged research universities to give their students “the opportunity to learn through inquiry rather than the simple transmission of knowledge” and to prepare students for “...whatever may lie beyond graduation, whether it be graduate school, professional school, or first professional position” (Boyer Commission on Educating Undergraduates in the Research University, 1998, p. 12). There is evidence that research experiences are especially important for minority students.

In this paper, we examine the role of practical research experience during the summer for talented minority undergraduates in STEM fields. The focus is on the link between summer research participation and STEM PhD pursuit. To examine evidence on this question we use detailed data on students participating in the Meyerhoff Scholarship Program (MSP) at the University of Maryland Baltimore County over a 14 year period. The MSP program incorporates multiple components designed to strengthen academic and social skills of minority students and thus increase their representation in STEM fields. Program components include financial scholarships, recruitment weekend, Summer Bridge, study groups, program values, program community, personal advising and counseling, tutoring, summer research internships, academic year research, faculty

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involvement, and administrative involvement (for in-depth description, see Gordon & Bridglall, 2004; Maton, Hrabowski, & Schmitt, 2000). Since the program's inception in 1989, more than 600 participants have obtained their undergraduate degrees in STEM disciplines. In addition, more than 70 alumni from the program have earned their PhD or MD/PhD degrees, while nearly 300 alumni are currently enrolled in graduate and professional degree programs nationwide (UMBC, Meyerhoff Scholarship Program website).

During their undergraduate years, students are encouraged to participate in multiple summer research internships in both academic and non-academic settings (Maton & Hrabowski, 2004). The MSP places students in summer research internships at about 160 different sites. These include research laboratories at UMBC, other U.S. universities, and international locations. In addition, summer research internships are also offered at private corporations (e.g., IBM, AT&T, HP, Silicon Graphics Systems, Lockheed Martin, 3M, and Apple), government sites (e.g. NIH, FDA, NIST, NASA, and CIA), and pharmaceutical companies (e.g., Merck, Pfizer, and AstraZeneca). There are several aims for these summer research experiences, which include, but are not limited to, familiarizing scholars with the practice of STEM research and careers, and strengthening a student's resume (Gordon & Bridglall, 2004).

In this study we compare students who took courses, worked as counselors, or did not participate in any activities during summer to those who participated in summer research internships. To test the effects of summer research, we control for a variety of background, academic and family characteristics. The results of this study provide evidence of strong positive effects of summer research participation on STEM PhD pursuit. Further, the analysis shows that the effects of summer research vary with the frequency and timing of these experiences. The evidence that educational strategies such as summer research experiences improve academic outcomes of

minorities is vital, given concern about the science pipeline in the U.S. and the continuing growth in the racial/ethnic diversity of the college-age population.

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