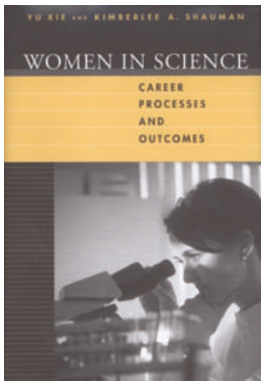
How science fails women – and men



Women in Science
Career Processes and Outcomes

by Yu Xie and Kimberlee A. Shauman

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Why do men dominate the science, technology, engineering and mathematics (STEM) fields? According to the leaky pipeline metaphor, women leave science at higher rates than men do; not only are there too few women in the pipeline, but the pipeline selectively leaks women. In '*Women in Science: Career Processes and Outcomes*', sociologists Xie and Shauman make use of several large U.S databases to examine sex differences at key transition points in a scientist's life. They reject the leaky pipeline metaphor as oversimplified, but their data largely confirm its existence. At each transition point, science loses more females than males. By senior year of high school, twice as many boys as girls intend to major in a STEM field once in college. Why? Not because of differences in ability: sex differences in 8th-, 10th- and 12th-grade achievement tests do not account for the sex differences in intended major. In fact, Xie and Shauman have discovered that none of a large list of demographic or personal characteristics or beliefs account, individually or together, for much of the sex disparity in high schoolers' intention to major in STEM.

The authors show that the juncture between high school and college is critical: very few students of either sex enter science after their first year in college, and few re-enter after leaving (again confirming a pipeline metaphor). Further, similar proportions of girls and boys continue in science after the first year. Between high school and college, however, girls intending to major in science leave with a greater frequency than boys, and a lower frequency of girls than boys intending to undertake a non-science major deviate from it to enter science. Although a higher percentage of girls than boys with science degrees began with non-science intentions, that fact is merely a statistical consequence of having so many high-school girls with non-science intentions. Importantly, the authors' data reveal that science is not a big draw for boys either. More boys leave science than enter it, and only a quarter of the high-school boys who intended to major in science end up with a science college degree. The authors' data suggest that our institutions fail boys as well as girls; therefore, changes to attract and retain girls may also help attract and retain boys.

For those who earn a college or masters degree, Xie and Shauman find that the specific subfield and the differential impact of having children predict continuation in science. The primary cost of childbirth is the disproportionate loss of mothers from the full-time labour force. Even among the unmarried, more women than men drop out of science, but the sex disparity is exacerbated among parents. Fathers are more likely, and mothers less likely, to continue in science than their childless counterparts. For scientists who remain full-time, there are significant costs of sex alone, with parenthood adding little to explain sex differences in salary, promotion or productivity. Single women make less money than single men, and married women without children make even less money than married men without children (because men get a marriage benefit that women do not); adding children does not change that ratio. Xie and Shauman also report that mothers are much less likely than fathers to be promoted, but the rather old data for this finding (1989) may be misleading. In recent analyses of doctoral recipients up to 1995, the differential effects of parenthood lessen over time, with attrition from full-time employment remaining the main disparity (J. Scott Long, *From scarcity to visibility* (National Acadamies Press, Washington, DC, 2001)).

Replicating most previous studies, Xie and Shauman report that the sex disparity in productivity is decreasing over time and that differences are not attributable to parental status: mothers publish as much as childless women. How do mothers do it? Other research shows that mothers are more efficient researchers and writers than fathers. At equivalent productivity levels, mothers spend 75–80% as much time on research and writing as fathers, thus accomplishing more in less time. As Xie and Shauman argue, sex disparities in publication rate are probably the result of structural variables: women, for example, are less likely to be at institutions that put a premium on publication. Other researchers have shown that one's institution determines one's productivity as much as, or more than, one's productivity determines one's location.

There are limitations to Xie and Shauman's approach: first, they did not conduct regression analyses separately for males and females, which would have helped determine what variables predict the careers of each sex; second, they do little to integrate their work with previous analyses. Xie and Shauman only give a cursory mention to the most comprehensive analysis of doctoral scientists (noted above) and scant social psychological research showing that men are consistently evaluated more positively than women (Virginia Valian, *Why so slow?* (MIT Press, Cambridge, MA, 1998)). Finally, although the authors recognize that 'choice' needs quotation marks, and although their own analyses show the impact of institutional factors, they couch their discussion in the vocabulary of women's choice: women "withdraw"; it is difficult for women to "have it all". Yet men also "withdraw" and, if they are absent fathers, also fail to "have it all".

Where should we go next? If our goal is the full participation of women and men in science, the authors' data show that we need to make science more attractive to all youngsters and to improve our perceptions of competence so that females and males have the same chance to excel.

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