Researcher gender and gendered research: Inventor-pool composition and the disease impact of biomedical innovations

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Abstract

Prior studies have found lower participation rates in innovation by women, minorities, and lower socioeconomic classes as well as considerable challenges for those that do participate. Does this limited participation affect the kinds of innovations that take place? We assemble a unique dataset that links the universe of medical inventions recorded in USPTO patents both to the gender of the inventors and to the gender-related aspects of the inventions. We code the gender for a larger share of inventors than previous research has, and we use the MeSH keywords from the National Library of Medicine to identify inventions that focus on female- and male-specific diseases or conditions. We find robust correlations between women inventors and female-focused innovations. Research teams with women (particularly in the lead-researcher role) are more likely to produce patents that focus on women; and patents that target disproportionately female diseases and conditions are more likely to have women inventors listed on them. In each case, the effect sizes are substantial, ranging from 5 to 20 percent above baseline probabilities. These findings are a striking example of how diversity in team composition can produce diversity in ideas, interests, and ultimately innovations.
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Does an increase in the number of women doing medical research lead to more medical advances for women? Commentators have underlined the historical under-investment in research on diseases and medical conditions that disproportionately affect women. To some extent, this discrepancy may reflect the historic under-representation of women in biomedical research fields. Yet adding women researchers need not close this gap. Researchers rarely have complete control over their research topics, and if women researchers spend most of their time with teams that have existing research agendas, they may help to reproduce the existing, biased structure of knowledge generation. In this regard, research labs may mirror other organizational settings, where women managers often make decisions comparable to their male colleagues, including when evaluating and promoting other women.

Exploring this question requires data both on the composition of the population of inventors and the content of their inventions. We assemble a unique dataset that links the universe of medical inventions recorded in PATSTAT to disease classifications produced by the National Library of Medicine’s MeSH Indexer and the longitudinal Global Burden of Disease database produced by the Institute for Health Metrics and Evaluation. We develop a machine-classification algorithm to disambiguate names and code gender for a larger share of inventors than previous research has. Tying together PATSTAT, MeSH and the GBD database lets us classify the content of researchers’ output in terms of whether and how the target disease or condition disproportionately affects one gender, and lets us weight these innovations by the disease or condition’s prevalence in the global population. The size of this corpus of inventions lets us include multiple fixed effects to account for heterogeneity in classes of inventions, as well as secular changes in the share of women doing research in different patent classes over time.

In our preliminary analyses, we find strong correlations between women inventors and female-focused innovations. Research teams with women are more likely to produce patents that focus on women, and patents that target disproportionately female diseases and conditions are more likely to have women inventors listed on them. In each case, the effect sizes are substantial, ranging from 5 to 20 percent above baseline probabilities. The effect is strongest when female researchers are in leadership positions on their teams, which jibes with the idea of such inventors having more control over their research agendas. It is less clear in these early results, though, that the increase in women researchers has shifted the aggregate impact of biomedical innovation toward women. Women researchers are also more likely to focus on higher-impact diseases and conditions than male researchers; and higher-impact diseases and conditions are more evenly distributed across genders. Thus, while female inventors’ output affects more women than their male counterparts’, their output also affects more men than their male counterparts’. These early results suggest a novel type of knowledge spillover and demonstrate that increasing diversity in team composition and inventions need not imply a tradeoff in the overall composition of innovation.