When Hard Work Doesn’t Pay Off
Exploring Self-Perceptions to Understand the Underrepresentation of Women in STEM

by Karyn L. Lewis, Ph.D. candidate, Department of Psychology

Despite moving beyond old prejudices that closed the doors to women interested in pursuing science and technology, recent statistics from the National Science Foundation show that men still outnumber women in the “STEM” (science, technology, engineering, and math) fields, sometimes by ratios of 3.5 to 1. Unfortunately, there are no simple answers as to how to understand the causes of this disparity and successfully intervene. As social psychologists, we can use our training to understand how the social context of these traditionally male-dominated fields might affect the participation and persistence of women. Past work by other social psychologists has primarily examined contextual factors that affect women’s objectively measured performance. For instance, the seminal research by Claude Steele and his colleagues on stereotype threat has shown that even seemingly small things, like marking one’s gender on a standardized test prior to taking the test or being the only female present in a classroom are enough to cause a cascade of internal events, such as worrying about confirming negative stereotypes, that in turn can eat up precious cognitive capacity and in the end undermine women’s performance.

This past work greatly enhanced our understanding about influences on women’s performance in STEM. However, we know that it isn’t performance alone that predicts persistence in STEM fields. In fact, the subjective perception of how one is doing in a field (which doesn’t necessarily correlate with actual performance), over and above objective performance, can also predict motivation and persistence in that field. My work, done in collaboration with my graduate advisor, Dr. Sara Hodges, has been focused on understanding what situational factors affect women’s self-perceptions and how these self-perceptions in turn affect decisions to persist in STEM.

Specifically, we have been examining how women think about effort and hard work in the context of math and science fields. Unfortunately, math and science skills are often perceived to come “naturally”—something you’ve either got or you don’t. What’s more, women are often stereotyped as lacking the quantitative skills necessary to succeed in math and science. In reality, plenty of effort is required of anyone hoping to succeed in these fields, but stereotypes about who should be good, and how success is achieved, may lead women to interpret their efforts differently than their male peers. We predicted that women would perceive that the work in their field is uniquely hard and requires more effort for them compared to their peers, and that these perceptions would lead to further negative outcomes such as decreased sense of fit with the field and decreased motivation.

To study this we contacted first year graduate students enrolled in STEM fields of study at the University of Oregon, along with first year graduate students at Montana State University, where our collaborator Dr. Jessi L. Smith helped us to recruit a sample that broadened our range of STEM fields. We asked both male and female graduate students to compare themselves to the average student in their field in terms of how much effort they have to expend in their graduate programs. We also asked them to report how much they felt like they “fit in” or belong academically and how motivated they felt to pursue their studies. As predicted, even though women’s objective performance did not differ from their male peers, the women perceived themselves to be struggling more than average, whereas men did not. Furthermore, feeling this way led women to experience less of a sense of academic fit, which in turn led to less motivation to pursue their studies. This cascading series of events was not present in data for the men.

Something about STEM fields seems to make women feel that they have to work harder than others to succeed which leads to decreased sense of belonging and motivation. These results may seem depressing (and indeed, because of the negative implications for women’s presence in STEM when our predictions are confirmed, researching these topics puts us in a conflicted role of wanting to root against our own hypotheses). So, we went a step further to ask if anything could be done to intervene and bolster women’s motivation.

To do this, we told advanced female undergraduates (who presumably had graduation plans on their mind) about a new science program (the fictional field of “Eco-psychology,” fabricated for this study) that the university was considering adding to the curriculum. To mimic the conditions women encounter when considering STEM programs, participants were presented with an informational brochure that included a list of faculty with primarily male names and displayed photographs that were predominantly of men. After participants gave some information about themselves (e.g., GPA and answers to a “career inventory”), they were given feedback on their viability as a candidate for the Eco-psychology program. All women were told that based on their GPA and responses, “you are a good candidate and would likely succeed in the program.” However, the critical message that came next differed. Some women were told that to achieve this success “you would have to put in more effort than others,” whereas other women were told that “like everyone else, you would have to put in a lot of effort.” We then compared the two groups in terms of their sense of academic belonging in the field and their motivation to pursue the field. We found that the simple intervention of normalizing effort led women to show elevated feelings of belonging and increased motivation to pursue the field.

We think that these results are striking—and heartening. Yes, it is concerning that women seem to be either misperceiving their peers’ level of effort and/or the meaning of their own level of effort. However, our results are also encouraging because they suggest a possible intervention that may be relatively easy and inexpensive to implement. By making it clear to women that effort is typical and expected, we may be able to override the default assumptions that success in a science field requires “natural” scientific ability (which women are stereotypically understood to lack). Similar positive effects may emerge when STEM practitioners talk candidly to one another (and maybe most importantly to their students) about the struggles and effort it takes to make it in these fields.

—Karyn Lewis, a fifth-year doctoral student in the Department of Psychology, received a 2010 CSWS graduate student research grant.