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Beyond biology: The importance of cultural factors in explaining gender disparities in STEM preferences

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Abstract

Gender disparities in participation in many STEM fields, particularly computer science, engineering, and physics, remain prevalent in Western societies. Stewart-Williams and Halsey contend that an important contributor to these disparities is gender differences in career-related preferences that are driven partly by biology. We argue that Stewart-Williams and Halsey understate the influence of cultural factors in shaping these preferences. We provide evidence for an important and overlooked cultural factor that contributes to gender disparities in computer science, engineering, and physics: masculine defaults. Masculine defaults exist when cultures value and reward traits and characteristics associated with the male gender role and see them as standard (Cheryan & Markus, 2020). We provide examples of how changing computer science, engineering, and physics cultures can decrease gender disparities in participation. Finally, we discuss policy implications, specifically the importance of (1) recognizing that preferences for STEM are malleable and (2) addressing exclusionary cultures of STEM fields. Recognizing and changing exclusionary STEM cultures are important for creating a society that is more just and equitable.

Keywords

Gender disparities, STEM, masculine defaults, culture

How do we explain gender disparities in STEM participation, and what can be done to remedy these disparities? Stewart-Williams and Halsey (2021) argue that "the most important contributor to the differential representation of men and women in STEM [is] sex differences in certain career-relevant preferences" (p. 4). We agree that gender differences in preferences are a primary cause of gender disparities in some STEM fields[1] in many Western societies. However, we argue that Stewart-Williams and Halsey understate the influence of cultural factors in shaping those gendered preferences. These cultural factors are critical to recognize for a complete understanding of what causes gender disparities and how to remedy them. As we argue below, Western societies are not built in a way that allows women to choose computer science, engineering, and physics (CSEP) with the same ease as men.

We first address the argument that gender disparities in STEM participation may be due to biological differences between women and men. We then describe an example of an important cultural factor that is overlooked in Stewart-Williams and Halsey's analysis, but which powerfully contributes to gender disparities in preferences for CSEP. Next, we provide evidence of places in which gender disparities in CSEP participation are much smaller or nonexistent. Finally, we discuss policy implications, arguing that initiatives addressing gender disparities in CSEP must include efforts to address cultural barriers to women's participation.

Addressing the argument of biology

Stewart-Williams and Halsey argue that both social factors and biological differences between women and men[2] are significant contributors to gender disparities in STEM participation. There are three reasons why we find the biological explanation troubling. First, many researchers have written about the insufficiency of the biology argument in explaining gender disparities in STEM participation (e.g. Ceci, 2018; National

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Academics of Sciences, Engineering, and Medicine, 2007). For example, according to a National Academics of Sciences, Engineering, and Medicine (2007) report,

> Studies of brain structure and function, of hormonal modulation of performance, of human cognitive development, and of human evolution have not revealed significant biological differences between men and women in performing science and mathematics that can account for the lower representation of women in these fields (p. 25).

Biological differences raised by Stewart-Williams and Halsey, such as their argument about gender differences in spatial ability, also cannot account for why gender disparities in participation in some STEM fields (e.g. mathematics, chemistry) are so much smaller than gender disparities in CSEP (Cheryan et al., 2017).

Second, discussing biological differences as an explanation for current gender disparities causes subsequent gender disparities and heightens prejudice. Attributing gender disparities in math performance to genetic differences caused women to perform worse on a math test compared to attributing gender differences to experiential causes (Dar-Nimrod & Heine, 2006). Reading research findings that attributed gender differences in personality and behavior to sex differences in the brain caused students to have greater prejudicial attitudes toward transgender people and lower intentions to support their rights (e.g. Ching & Xu, 2018). Attributing gender disparities to biological differences is treading on dangerous ground and must be undertaken carefully.

The third reason we are wary of Stewart-Williams and Halsey's argument for the importance of biology is because they use a process-of-elimination approach to arrive at this conclusion. According to Stewart-Williams and Halsey, because evidence for bias and discrimination is mixed, the underlying reason for gendered preferences must be due in part to biological differences. A process-of-elimination approach works only if all possible factors are considered. As we describe below, Stewart-Williams and Halsey leave out of their analysis an important form of bias—masculine defaults (Cheryan & Markus, 2020)—that shapes preferences for CSEP fields.

A fuller consideration of bias and discrimination

One reason Stewart-Williams and Halsey found mixed evidence for bias and discrimination is because they defined bias and discrimination too narrowly. A full consideration of bias and discrimination is necessary to account for the many ways in which certain STEM cultures are biased and discriminatory against women. Stewart-Williams and Halsey conceptualize bias and discrimination as differential treatment or judgment of women compared to men (e.g. harassment, passing over a qualified candidate). However, there is another important form of bias that powerfully shapes the outcomes of women in STEM, even in the absence of differential treatment of women. Masculine defaults exist when traits and characteristics consistent with the male gender role are valued, rewarded, or viewed as standard (Cheryan & Markus, 2020). STEM fields are saturated with masculine defaults, such as valuing working late nights (Correll et al., 2014; Hewlett & Luce, 2006), cutthroat and competitive environments (Catanzaro et al., 2010; Reid et al., 2018), and policies that reward self-promotion (Kang, 2014; Rudman, 1998). Masculine defaults reflect a foundational favoring of characteristics and behaviors commonly associated with men. They prevent many women and people of other genders who are not socialized to participate in and emulate these defaults from entering and succeeding in majority-male fields and occupations (Cheryan & Markus, 2020).

Below we provide three empirical examples of masculine defaults in STEM, but see Cheryan and Markus (2020) for many more examples:

- Faculty in CSEP were more likely than faculty in other fields (e.g. psychology) to believe that innate brilliance is required to be successful in their fields (Leslie et al., 2015). Brilliance was more commonly attributed to boys than girls ($ds = .61 - .77$ among 6- and 7-year-olds; Bian, Leslie & Cimpian, 2017). Girls expressed less interest than boys in activities that are stated to be for brilliant people (meta-analytic effect size: $d = .51$; Bian et al., 2017). Brilliance stereotypes in these majority-male fields persist despite current stereotypes in Western societies associating girls with doing well in school (Hartley & Sutton, 2013).
- Computer science classrooms that fit current stereotypes of the field (e.g. Star Trek posters, video games) caused girls to feel a lower sense of belonging and less interest in entering computer science than computer science classrooms that did not fit current stereotypes of the field (e.g. nature posters, art; $d_{\text{belonging}} = .40$, $d_{\text{interest}} = .36$; Master et al., 2016).
- Women applying for funding from the Gates Foundation were less likely to be funded than were men, even though reviewers were blind to gender information (Kolev et al., 2019). Despite no differences in scientific output, reviewers favored proposals that used broad language (i.e. language that was common across the different proposal topics) over proposals that used narrow language (i.e. language that was more topic-specific). Use of broad language that is more

abstract and less specific is more common among men than women (Joshi et al., 2020), perhaps because doing so draws on stereotypically masculine traits such self-promotion (Rudman, 1998).

Masculine defaults disadvantage women relative to men for four primary reasons. First, women are often not socialized to engage in or display emotions, behaviors, and characteristics associated with the male gender role (Brody, 2000). As a result, some masculine characteristics may be relatively rarer in women than men. For example, women in academia are less likely than men to self-promote in the form of self-citations, with men self-citing 56% more than women (King et al., 2017). Second, even when women and men are equally likely to have or display stereotypically masculine characteristics (e.g. deliver identical venture capital pitches), women may be less recognized as having those characteristics (approximate *d*s = .46,75; Brooks et al., 2014; Moss-Racusin et al., 2012). Third, when women display stereotypically masculine behaviors such as explicit dominance, they can encounter backlash in the form of lower likeability and hireability (meta-analytic $d_{likeability} = .19$; meta-analytic $d_{hireability} = .58$; Williams & Tiedens, 2016). Black women also face additional challenges in these spaces. They can be perceived as too masculine (approximate $d = 1.20$; Goff et al., 2008; see also Hall et al., 2015) and are less likely to be heard and recognized for contributions ($d = .53$; Sesko & Biernat, 2010; see also Purdie-Vaughns & Eibach, 2008). Fourth, when women shift their self-presentation to align with masculine norms, they report feeling less authentic as a result ($d = .20$; Garr-Schultz & Gardner, 2018). Masculine defaults create barriers to participation and success for many women.

There are three important points about masculine defaults and gender disparities in CSEP. First, masculine defaults influence women's and men's preferences for entering CSEP fields, even before they have set foot in a CSEP company or taken a CSEP class (Cheryan et al., 2009). Gender disparities in preferences thus result in part from masculine defaults. Second, masculine defaults require a different set of remedies than differential treatment. In the Gates Foundation study described above, reviewers were blind to gender, something that Stewart-Williams and Halsey argue "automatically eliminates *all* forms of bias" (p. 21). Though anonymity may address differential treatment, masculine defaults and resulting disparities persist. Finally, masculine defaults prevent finding the most qualified people. In the Gates Foundation study, proposals that used broad language had no higher scientific output than proposals with more topic-specific language. The use of this masculine default to make funding decisions was not effective in selecting the best proposals. Masculine defaults disadvantage women, restrict talent pools, and prevent organizations from performing up to their full potential.

For a more complete understanding of why gender differences in preferences for CSEP persist, we must consider more well-studied barriers such as differential treatment and more hidden barriers such as masculine defaults. Both forms of biases are important in understanding why gender disparities in preferences exist, and both are turning girls and women away before they even enter the door.

Changing CSEP cultures decreases gender disparities in preferences

If gender preferences are shaped by cultural factors that can be changed, we should be able to locate examples of how changing CSEP cultures leads to more equitable representation of women. Such evidence can be found cross-culturally in places that graduate a far higher proportion of women in CSEP than Western societies, in historical trends from Western societies, and from contemporary attempts to change CSEP cultures.

Many countries outside the U.S. and Western Europe grant a significantly higher proportion of CSEP degrees to women. For example, in Malaysia, women receive more computer science degrees than do men. Computer science in Malaysia is seen as "indoor work" and therefore less male-oriented (Mellström, 2009). In another example, nearly three-quarters of engineering students at Kuwait University in Kuwait are women (National Academics of Sciences, Engineering, and Medicine, 2020). These examples from Eastern contexts highlight how cultural factors are important in determining gender representation in CSEP fields.

Cultural and historical trends within the U.S. also point to the importance of cultural factors in shaping women's preferences for CSEP. The first computer programmers were women (Misa, 2010), and the proportion of undergraduate degrees granted to women in computer science peaked in the mid-1980s at 37% and has since decreased to less than 20% (National Science Foundation, 2015). This decrease after the mid-1980s may, in part, be due to the PC revolution and the dissemination of cultural stereotypes of computer scientists as young, White, men who work around the clock in their garages (Misa, 2010). These stereotypes interfered with many women's and girls' perceptions of whether they belong in computer science (e.g. Cheryan et al., 2009; Master et al., 2016). Looking at historical trends reveals that when cultural factors changed, the proportion of women in computer science changed as well.

Harvey Mudd College (HMC) provides a concrete example of how changing a CSEP culture reduces gender disparities in preferences. In 2006, only 10% of computer science degrees at HMC were granted to women. At that time, the department had a cultural value favoring students with prior programming experience. Students without prior experience felt lower levels of belonging in their classes (Xia, 2017) and were intimidated by peers with more prior programming experience who dominated class discussions (Klawe, 2013). This cultural value was a masculine default because men were more likely than women to have prior programming experience (Barron, 2004; Nord et al., 2011). HMC addressed this masculine default by splitting their introductory class into two classes to account for varying programming experience levels. Splitting the class also created a less intimidating environment for students without prior experience. Within four years of implementing these changes, the proportion of computer science degrees granted to women increased to over 55% (Xia, 2017). Examples such as HMC show how shifts in values, policies, and practices can turn into changes in representation, recruitment, and retention of women in CSEP.

Many CSEP cultures are not set up in ways that allow women to enter and thrive as easily as men. Yet the above examples show how these cultural barriers to women's entry and success are not universally present and can be addressed. When cultural barriers are less prominent, gender disparities in preferences and participation are smaller as well.

Policy implications

How should efforts to address gender disparities in STEM participation be approached? Stewart-Williams and Halsey state that we should "consider whether the ultimate aim of such interventions should be to eliminate sex differences in STEM, or simply to eliminate bias and barriers, and let the cards fall where they may" (p. 4). While we agree that eliminating barriers should be a goal of interventions in STEM, effective work in this area requires considering a scope of change significantly larger than the one proposed by Stewart-Williams and Halsey.

Stewart-Williams and Halsey suggest that our goal should not be to increase representation, but rather to simply provide women with information about STEM and then let the cards fall where they may. Limiting efforts to this scope has two main pitfalls:

1. Group differences in preferences are not set in stone and can be shifted by changes as small as how information about STEM is presented, and
2. The underlying causes of reduced interest, sense of belonging, and negative experiences of women in STEM continue unchanged.

Below we discuss why each of these shortcomings must be considered and addressed for policy efforts to be effective.

Treating group differences in preferences as stable and unchanging neglects the numerous things that we as a society can do to address these disparities. Interventions such as framing STEM as affording the pursuit of communal goals (i.e. helping and working with others) increased women's interest in STEM (Diekman et al., 2017). Changing the wording of job advertisements to sound less stereotypically masculine (e.g. from "boasts many leading clients" to "have effective relationships with many satisfied clients") increased women's sense that they belonged in those jobs (Gaucher et al., 2011). These examples make clear that we must not simply communicate information about STEM fields, but we must also consider how that information is presented. Even small changes in STEM culture are powerful enough to reduce gender disparities in STEM preferences.

Effective efforts to address the gender gap in STEM should address the root causes of women's lack of participation. Stewart-Williams and Halsey note that challenging common STEM stereotypes may encourage women to show interest in STEM fields. They caveat that "this should be done only to the extent that the stereotypes in question are in fact inaccurate" (p. 20). We argue that the goal of interventions in STEM should be to change the culture of STEM itself such that any off-putting stereotypes become unarguably false in the process. Rather than just informing women about STEM, we should focus on shifting STEM cultures to be more inclusive for individuals from all backgrounds. This process begins by closely examining the environments and existing norms of STEM fields, identifying those that lead to disparate impacts between groups, and doing the work to address them.

Increasing the participation of women in STEM can further change exclusionary cultures. Higher proportions of women in STEM predict weaker masculine stereotypes of STEM fields (Miller et al., 2015). These weakened stereotypes, in turn, reduce barriers to women's interest and participation (Cheryan et al., 2009, 2017). Weaker masculine STEM stereotypes are also associated with smaller gender disparities in math and science achievement (Nosek et al., 2009). Changing STEM cultures can be achieved through a recursive process where eliminating barriers and increasing numerical representation of women in STEM are mutually reinforcing. Increasing representation is a tool to achieve real changes in STEM cultures.

Ultimately, rather than allowing STEM fields to remain as they are and informing women of their current realities, we should focus on a broad scope of policy efforts to address and change STEM's exclusionary cultures. This requires identifying previously unquestioned norms and cultural practices and implementing appropriate interventions. Creating more inclusive STEM cultures is important to increase women's participation.

Conclusion

Women and men in Western societies currently express different aggregate preferences for CSEP. We contend that these differences in preferences are powerfully shaped by cultural factors. To accept such differences as inherent and unchanging maintains a status quo that could be improved—and has been improved in many places. One important step toward equity is broadening our definition of bias and discrimination to recognize and address underlying cultural factors, including masculine defaults. By doing so, we can increase the participation of girls and women and enable them to be successful as they pursue such interests.

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Notes

1. Gender differences in preferences for STEM are prominent in computer science, engineering, and physics and smaller or not existent in biology, math, and chemistry in the US. (Cheryan et al., 2017). We focus on the former fields when explaining gender differences in preferences and discuss STEM more broadly when describing exclusionary cultures and policy implications.
2. Though we, like Stewart-Williams and Halsey, focus on women and men in this commentary, it is important to note that gender is not binary or fixed and is instead dynamic, malleable, and has many different forms (Hyde et al., 2019).

References

Barron, B. (2004). Learning ecologies for technological fluency: Gender and experience differences. *Journal of Educational Computing Research*, *31*(1), 1–36. https://doi.org/10.2190/1N20-VV12-4RB5-33VA

Bian, L., Leslie, S. J., & Cimpian, A. (2017). Gender stereotypes about intellectual ability emerge early and influence children's interests. *Science*, *355*, 389–391. https://doi.org/10.1126/science.aah6524

Brody, L. R. (2000). The socialization of gender differences in emotional expression: Display rules, infant temperament, and differentiation. *Gender and Emotion: Social Psychological Perspectives*, *2*(11), 122–137.

Brooks, A. W., Huang, L., Kearney, S. W., & Murray, F. E. (2014). Investors prefer entrepreneurial ventures pitched by attractive men. *Proceedings of the National Academy of Sciences of the United States of America*, *111*(12), 4427–4431. https://doi.org/10.1073/pnas.1321202111

Catanzaro, D., Moore, H., & Marshall, T. R. (2010). The impact of organizational culture on attraction and recruitment of job applicants. *Journal of Business and Psychology*, *25*, 649–662. https://doi.org/10.1007/s10869-010-9179-0

Ceci, S. J. (2018). Women in academic science: Experimental findings from hiring studies. *Educational Psychologist*, *53*(1), 22–41. https://doi.org/10.1080/00461520.2017.1396462

Cheryan, S., & Markus, H. R. (2020). Masculine defaults: Identifying and mitigating hidden cultural biases. *Psychological Review*, *127*(6), 1022–1052. https://doi.org/10.1037/rev0000209

Cheryan, S., Plaut, V. C., Davies, P. G., & Steele, C. M. (2009). Ambient belonging: How stereotypical cues impact gender participation in computer science. *Journal of Personality and Social Psychology*, *97*(6), 1045–1060. https://doi.org/10.1037/a0016239

Cheryan, S., Ziegler, S. A., Montoya, A. K., & Jiang, L. (2017). Why are some STEM fields more gender balanced than others? *Psychological Bulletin*, *143*(1), 1–35. https://doi.org/10.1037/bul0000052

Ching, B. H.-H., & Xu, J. T. (2018). The effects of gender neuroessentialism on transprejudice: An experimental study. *Sex Roles*, *78*(3), 228–241. https://doi.org/10.1007/s11199-017-0786-3

Correll, S. J., Kelly, E. L., O'Connor, L. T., & Williams, J. C. (2014). Redesigning, redefining work. *Work and Occupations*, *41*(1), 3–17. https://doi.org/10.1177/0730888413515250

Dar-Nimrod, I., & Heine, S. J. (2006). Exposure to scientific theories affects women's math performance. *Science*, *314*(5798), 435. https://doi.org/10.1126/science.1131100

Garr-Schultz, A., & Gardner, W. L. (2018). Strategic self-presentation of women in STEM. *Social Sciences*, *7*(2), 1–16. https://doi.org/10.3390/socsci7020020

Gaucher, D., Friesen, J., & Kay, A. C. (2011). Evidence that gendered wording in job advertisements exists and sustains gender inequality. *Journal of Personality and Social Psychology*, *101*(1), 109–128. https://doi.org/10.1037/a0022530

Goff, P. A., Thomas, M. A., & Jackson, M. C. (2008). "Ain't I a woman?": Towards an intersectional approach to person perception and group-based harms. *Sex Roles*, *59*(5–6), 392–403.

Hall, E. V., Galinsky, A. D., & Phillips, K. W. (2015). Gender profiling: A gendered race perspective on person–position fit. *Personality and Social Psychology Bulletin*, *41*(6), 853–868. https://doi.org/10.1177/0146167215580779

Hartley, B. L., & Sutton, R. M. (2013). A stereotype threat account of boys' academic underachievement. *Child Development*, *84*(5), 1716–1733. https://doi.org/10.1111/cdev.12079

Hewlett, S. A., & Luce, C. B. (2006, December). Extreme jobs: The dangerous allure of the 70-hour workweek. *Harvard Business Review*. https://hbr.org/2006/12/extreme-jobs-the-dangerous-allure-of-the-70-hour-workweek

Hyde, J. S., Bigler, R. S., Joel, D., Tate, C. C., & van Anders, S. M. (2019). The future of sex and gender in psychology: Five challenges to the gender binary. *American Psychologist, 74*, 171. https://doi.org/10.1037/amp0000307

Joshi, P. D., Wakslak, C. J., Appel, G., & Huang, L. (2020). Gender differences in communicative abstraction. *Journal of Personality and Social Psychology*, *118*(3), 417–435. https://doi.org/10.1037/pspa0000177

Kang, C. (2014, April 2). Google data-mines its approach to promoting women. *Washington Post*. https://www.washingtonpost.com/news/the-switch/wp/2014/04/02/google-data-mines-its-women-problem/

King, M. M., Bergstrom, C. T., Correll, S. J., Jacquet, J., & West, J. D. (2017). Men set their own cites high: Gender and self-citation across fields and over time. *Socius*, *3*, 1–22. https://doi.org/10.1177/2378023117738903

Klawe, M. (2013). Increasing female participation in computing: The Harvey Mudd College story. *Computer*, *46*(3), 56–58. https://doi.org/10.1109/MC.2013.4

Kolev, J., Fuentes-Medel, Y., & Murray, F. (2019). *Is blinded review enough? How gendered outcomes arise even under anonymous evaluation* (NBER Working Paper No. 25759). National Bureau of Economic Research. https://doi.org/10.3386/w25759

Leslie, S. J., Cimpian, A., Meyer, M., & Freeland, E. (2015). Expectations of brilliance underlie gender distributions across academic disciplines. *Science*, *347*(6219), 262–265. https://doi.org/10.1126/science.1261375

Master, A., Cheryan, S., & Meltzoff, A. N. (2016). Computing whether she belongs: Stereotypes undermine girls' interest and sense of belonging in computer science. *Journal of Educational Psychology*, *108*(3), 424–437.

Mellström, U. (2009). The intersection of gender, race and cultural boundaries, or why is computer science in Malaysia dominated by women? *Social Studies of Science*, *39*(6), 885–907. https://doi.org/10.1177/0306312709334636

Miller, D. I., Eagly, A. H., & Linn, M. C. (2015). Women's representation in science predicts national gender-science stereotypes: Evidence from 66 nations. *Journal of Educational Psychology*, *107*(3), 631–644. https://doi.org/10.1037/edu0000005

Misa, T. J. (2010). *Gender codes: Why women are leaving computing* (1st ed.). Wiley-IEEE Computer Society.

Moss-Racusin, C. A., Dovidio, J. F., Brescoll, V. L., Graham, M. J., & Handelsman, J. (2012). Science faculty's subtle gender biases favor male students. *Proceedings of the National Academy of Sciences of the United States of America*, *109*(41), 16474–16479. https://doi.org/10.1073/pnas.1211286109

National Academies of Sciences, Engineering, and Medicine. (2007). *Beyond bias and barriers: Fulfilling the potential of women in academic science and engineering*. The National Academies Press. https://doi.org/10.17226/11741

National Academies of Sciences, Engineering, and Medicine. (2020). *The inclusion of women in STEM in Kuwait and the United States: Proceedings of a workshop*. The National Academies Press. https://doi.org/10.17226/25820

National Science Foundation. (2015). *Table 11. Science and Engineering Degrees*: *1966–2012* (Detailed Statistical Tables NSF 15-326). National Center for Science and Engineering Statistics. https://www.nsf.gov/statistics/2015/nsf15326/pdf/nsf15326.pdf

Nord, C., Roey, S., Perkins, R., Lyons, M., Lemanski, N., Brown, J., & Schuknecht, J. (2011). The Nation's Report Card[TM]: America's High School Graduates. Results of the 2009 NAEP High School Transcript Study. NCES 2011-462. National Center for Education Statistics. https://eric.ed.gov/?id = ED518324

Nosek, B. A., Smyth, F. L., Sriram, N., Lindner, N. M., Devos, T., Ayala, A., Bar-Anan, Y., Bergh, R., Cai, H., & Gonsalkorale, K. (2009). National differences in gender–science stereotypes predict national sex differences in science and math achievement. *Proceedings of the National Academy of Sciences of the United States of America*, *106*(26), 10593–10597. https://doi.org/10.1073/pnas.0809921106

Purdie-Vaughns, V. J., & Eibach, R. P. (2008). Intersectional invisibility: The distinctive advantages and disadvantages of multiple subordinate-group identities. *Sex Roles*, *59*(5–6), 377–391. https://doi.org/10.1007/s11199-008-9424-4

Reid, E. M., O'Neill, O. A., & Blair-Loy, M. (2018). Masculinity in male-dominated occupations: How teams, time, and tasks shape masculinity contests. *Journal of Social Issues*, *74*(3), 579–606. https://doi.org/10.1111/josi.12285

Rudman, L. A. (1998). Self-promotion as a risk factor for women: The costs and benefits of counterstereotypical impression management. *Journal of Personality and Social Psychology*, *74*(3), 629–645. https://doi.org/10.1037/0022-3514.74.3.629

Sesko, A. K. & Biernat, M. (2010). Prototypes of race and gender: The invisibility of Black a. J*ournal of Experimental Social Psychology, 46*, 356–360. https://doi.org/10.1016/j.jesp.2009.10.016

Stewart-Williams, S., & Halsey, L. G. (2021). Men, women, and science: Why the differences and what should be done? *European Journal of Personality, 35*, 3–37. https://doi.org/10.1177/0890207020962326

Toosi, N. R., Mor, S., Semnani-Azad, Z., Phillips, K. W., & Amanatullah, E. T. (2019). Who can lean in? The intersecting role of race and gender in negotiations. *Psychology of Women Quarterly*, *43*(1), 7–21. https://doi.org/10.1177/0361684318800492

Williams, M. J., & Tiedens, L. Z. (2016). The subtle suspension of backlash: A meta-analysis of penalties for women's implicit and explicit dominance behavior. *Psychological Bulletin*, *142*(2), 165–197. https://doi.org/10.1037/bul0000039

Xia, R. (2017, January 4). *Most computer science majors in the U.S. are men. Not so at Harvey Mudd.* Los Angeles Times. https://www.latimes.com/local/lanow/la-me-ln-harvey-mudd-tech-women-adv-snap-story.html