

RELEVANT PUBLICATIONS

Cole, B. P., Baglieri, M., Ploharz, S., Brennan, M., Ternes, M., Patterson, T., & Kuznia, A. (2018). What's Right With Men? Gender Role Socialization and Men's Positive Functioning. *American Journal of Men's Health*. DOI: 10.1177/1557988318806074

This study explored relations between conformity to masculine norms, gender role conflict, hope, and psychological well-being among a sample of 389 men from a university, with a predominantly White student body, located in the Midwestern United States. Bivariate correlations revealed that men's conformity to masculine norms and gender role conflict were positively correlated. Bivariate correlations revealed no significant relations between conformity to masculine norms, trait hope, and psychological well-being. Gender role conflict was associated with decreased hope and psychological well-being. Results of path analysis explained relations between conformity to masculine norms, gender role conflict, trait hope, and psychological well-being. This indicates that gender role conflict may contribute to lower trait hope and psychological well-being for college men. Although several aspects of conformity to masculine norms had positive associations with hope, these relations were significant and negative when men experienced gender role conflict. This work fills an important gap in the literature by examining the unique relations of conformity to masculine norms and gender role conflict to men's positive functioning. Results are discussed within the context of positive psychological theories including Frederickson's broaden and build theory of positive emotions, hope theory, Ryff's model of psychological well-being, and self-determination theory. Implications and future directions are discussed.

Munsch, C. L., & Gruys, K. (2018). What Threatens, Defines: Tracing the Symbolic Boundaries of Contemporary Masculinity. *Sex Roles*, 79(7-8), 375-392. DOI: 10.1007/s11199-017-0878-0

A robust literature ties emasculation to a range of compensatory behaviors. The present study shifts focus away from the effects of masculinity threat toward an understanding of young adult men's experiences of emasculation in their own words. Drawing on 42 in-depth interviews with undergraduate men attending a selective U.S. university, we examine the behaviors, situations, and narratives both experienced and hypothetical that privileged young men perceive as threatening. We use these data not only to contribute to the empirical literature on masculinity threat, but also as a novel approach for theorizing about the meaning and structure of masculinity more broadly. This is an important task given recent social and economic changes that may have altered contemporary definitions of masculinity. Emasculation accounts provide unique analytical leverage for revealing men's often unspoken understandings of acceptable masculine behavior. We find that, while many interviewees superficially espoused egalitarian and anti-homophobic beliefs, their emasculation narratives implicitly call for the subordination of women and other men. These performances consequently obscure and maintain traditional, hegemonic power relations. We discuss the implications of our finding for scholars, practitioners, and individual men who desire a more equitable gender structure.

Seron, C., Silbey, S., Cech, E., & Rubineau, B. (2018). "I am Not a Feminist, but. . ." : Hegemony of a Meritocratic Ideology and the Limits of Critique Among Women in

Engineering, Work and Occupations, 45(2), 131–167. DOI: 10.1177/0730888418759774

Engineering is often described as an enduring bastion of masculine culture where women experience marginality. Using diaries from undergraduate engineering students at four universities, the authors explore women's interpretations of their status within the profession. The authors' findings show that women recognize their marginality, providing clear and strong criticisms of their experiences. But these criticisms remain isolated and muted; they coalesce neither into broader organizational or institutional criticisms of engineering, nor into calls for change. Instead, their criticisms are interpreted through two values central to engineering culture: meritocracy and individualism. Despite their direct experiences with sexism, respondents typically embrace these values as ideological justifications of the existing distributions of status and reward in engineering and come to view engineering's nonmeritocratic system as meritocratic. The unquestioned presumption of meritocracy and the invisibility of its muting effects on critiques resembles not hegemonic masculinity—for these women proudly celebrate their femininity—but a hegemony of meritocratic ideology. The authors conclude that engineering education successfully turns potential critics into agents of cultural reproduction. This article contributes to ongoing debates concerning diversity in STEM professions by showing how professional culture can contribute to more general patterns of token behavior—thus identifying mechanisms of cultural reproduction that thwart institutional change.

O'Connor, P., O'Hagan, C., & Gray, B. (2017). Femininities in STEM: Outsiders Within. *Work, Employment and Society*, 32(2), 312–329. DOI: 10.1177/0950017017714198

This article describes a typological framework with axes relating to career and (non-work) relationship commitment to show how a specific cohort of women enact femininity(ies) in the context of the institutionalised practices that define science, technology, engineering and mathematics (STEM) as a masculine domain. Based on the accounts of 25 women in such disciplines in an Irish university, four types are identified: careerist femininity; individualised femininity; vocational femininity; and family-oriented femininity. All of these are constituted in relation to the meanings attached to the masculinist STEM career which performatively render women outsiders. The typology moves beyond the career/paid work and work/life dichotomies to encompass both the re-envisioning of career as vocation (Type 3) and the development of a highly individualised lifestyle orientation based on a high commitment to both (Type 2). It points to the variation, complexity and contradictions in how women do femininities in the academic STEM environment.

Appleby, R. (2018). Academic English and elite masculinities. *Journal of English for Academics Purposes*, 32, 42-52. DOI: 10.1016/j.jeap.2018.03.007

This paper addresses the ways in which the teaching of English for academic purposes by 'Western' teachers in Japanese higher education institutions is shaped by gender and sexuality. The paper draws on findings from a 5 year ethnographic study of white Western teachers of English in Japan. Drawing on interview data with 18 male participants, the paper points to the way elite status is attached to the teaching of English for academic purposes (TEAP) in contrast with teaching general English; the way TEAP is reproduced as a male-dominated activity among English-native-speaker teachers; and the way white Western men teaching in these contexts display an enhanced professional masculinity. Discourses articulated by the men also serve to position gendered Others as illegitimate or unworthy participants in TEAP. Although

the men's accounts tend to frame TEAP as a rational, disembodied, asexual occupation, the paper argues that gender and sexuality are deployed as identity gatekeeping tools that serve to police the borders of academic English as an elite, male-dominated professional category. In closing, I make proposals for transformation of gendered hierarchies in this context, but these would require shifts in deep-seated cultural, institutional, and interpersonal gender ideologies.

Kim, H., Cho, Y., Kim, S., & Kim, H. S. (2018). Women and Men in Computer Science: Geeky Proclivities, College Rank, and Gender in Korea. *East Asian Science Technology and Society – An International Journal*, 12(1), 33-56. DOI: 10.1215/18752160-4206046

The underrepresentation of women in computer science (CS) is an extensively reported phenomenon. The institutional culture of "geek" masculinity has been recognized as one of the important factors in explaining women's avoidance of CS in Western contexts. We conducted a survey and in-depth interviews to examine how Korean CS majors interpret their departmental culture and form a sense of belonging. To summarize our findings, Korean students' identification of themselves with geekiness was associated with university prestige more frequently than with gender. The geek identities and practices often associated with masculinity in Western contexts are related to university prestige in Korea. We do not argue that gender is irrelevant in constructing students' practices and identities in CS. Instead, we argue that it is important to analyze how gender appears more or less noticeably in the discursive construction of CS professional identities depending on contexts. This study calls for more careful attention to the processes through which the constructed symbolic hierarchies of geek over nongeek are mediated by unequal structures, including but not limited to gender, in CS. Our findings suggest that gendering in and of CS is more complicated than the dichotomy of male-technical versus female-social stereotypes.

Ide, M. E., Harrington, B., Wiggins, Y., Whitworth, T. R., & Gerstel, N. (2018). Emerging Adult Sons and Their Fathers: Race and the Construction of Masculinity. *Gender & Society*, 32(1), 5-33. DOI: 10.1177/0891243217743245

Challenging the public dichotomy characterizing fathers as involved or absentee, we investigate racial variation in college men's perceptions of their paternal relationships and the gendered constructions these promote. The analysis draws on intensive interviews (n = 76) with Asian American, Black, and white sons from one university and survey data (n = 1,576) from 24 institutions. In both data sets, Asian Americans and Blacks describe greater paternal distance than do whites. This conceals variations in sons' understanding of fathers. Asian Americans often criticize their fathers' distance, disidentifying with the near-exclusive focus on breadwinning they describe among fathers. In contrast, Blacks and whites normalize and identify with their dads. Blacks emphasize the laid-back, cool masculinity their dads impart, while whites often emphasize the independent masculinity based on mentorship and friendship their dads offer. Recasting sociological theories, we argue these differences emanate from divergent structural contexts, but more importantly, cultural conceptions of fatherhood, race, and gender as well as public discussions that valorize white models of fatherhood.

Angervall, P., Gustafsson, J., & Silfver, E. (2018). Academic career: on institutions, social capital and gender. *Higher Education Research & Development*, 37(6), 1095–1108. DOI:10.1080/07294360.2018.1477743

During decades of change in the Western higher education sector, new ways of understanding academic work have reinforced notions of the impact of social capital. The present study

investigates researchers' experiences of their own career making within two areas of Education Sciences in Swedish higher education: Childhood Studies (CS) and Science Education (SE). The structure at the CS departments is collaborative and integrated; teaching and research are seen as an entity. This structure creates a coherent career path where members of the collective group jointly produce and accumulate social capital; it also appears to be related to discourses of femininity. In the SE departments, the career structure is strategic and differentiated; the two career paths work in parallel through a differentiation between teaching and research. This appears to be related to discourses of masculinity. In conclusion, our analysis shows how social capital and gender mutually create different ways of doing an academic career.

Estrada, F., & Jimenez, P. (2018). Machismo and higher education: Examining the relation between caballerismo and ethnic identity, support seeking, and sense of connectedness among college Latinos. *Journal of Latinos and Education, 17*(3), 215-224. DOI: 10.1080/15348431.2017.1319367

Latino men, part of the nation's largest and fastest-growing minority group, stand to benefit from new knowledge related to factors that positively influence college persistence. In this study, the investigators examined whether machismo—a multidimensional and gendered social construct—was directly and indirectly associated with three outcomes associated with postsecondary success: connectedness at school, ethnic identity, and support-seeking behavior. Hierarchical moderated regression analysis on data from 140 mainly Mexican American undergraduates partially supported the hypotheses. Implications for college counselors and program coordinators are discussed, along with limitations of the study and areas for future scholarship.

Peralta, R. L., Mulhollem, M. L., Blue, C., & Stewart, B. C. (2018). The Association between Heavy Episodic Drinking and Gender Orientation among US College Students: The Significance of Masculinity. *Substance Use & Misuse, 53*(6), 910-920. DOI: 10.1080/10826084.2017.1385081

ackground: Heavy episodic drinking (HED) remains a public health concern among college students. Sex differences are routinely reported in the literature although some evidence of convergence in drinking patterns has been observed. The association between sex and gender-orientation in HED remains unclear because sex and gender are often conflated. Objective: We examine the intersection of sex, gender-orientation and HED to determine if gender-orientation alone and/or in conjunction with sex play a role in HED among college students. Methods: Data were collected using a web-based self-administered survey made available to students enrolled in courses at a mid-sized Midwestern public university during the Fall of 2013 and the Spring of 2014 (N = 793). Multiple logistic regression was used to determine the relationship between HED, sex, and gender orientation (measured using the short-form Bem Sex Role Inventory). Results: Our findings indicate that, regardless of sex, a masculine gender-orientation was positively associated with HED. Those who were found to have a feminine gender-orientation appeared to be at decreased risk for HED. Conclusions: Our findings indicate that sex and gender-orientation should be taken into account in prevention and intervention protocols at colleges and universities. Future work should examine the role of gender orientation among LGBTQ and ethno-racial minority populations.

Sheedy, C. (2018). Hegemony and Assessment: The Student Experience of Being in a Male Homogenous Higher Education Computing Course. *Practitioner Research in Higher Education*, 11(1), 59-69.

This work emanates from a previous study examining the experiences of male final year students in computing degree programmes that focused on their perceptions as students where they had few, if any, female classmates. This empirical work consisted of focus groups, with the findings outlined here drawn from two groups that were homogeneous with respect to gender. It identified that the masculinisation of computing and the resulting hegemonic masculinity has far-reaching impact. An unanticipated theme was how this homogeneity impacted their course assessments. Students participating in this research identified discomfort with their experience of the institutional hegemonic masculinity. Further work to understand how this hegemonic masculinity impacts teachers is also proposed.

Brooms, D. R., Clark, J., & Smith, M. (2018). Being and Becoming Men of Character: Exploring Latino and Black Males' Brotherhood and Masculinity through Leadership in College. *Journal of Hispanic Higher Education*, 17(4), 317-331.

This article advances knowledge on the significance of engagement and leadership for five Latino and Black male student leaders at a Hispanic-serving institution. By exploring their experiences in a male-centered initiative, identity and masculinity emerged as salient frames to understand students' engagement on campus. Individual and focus group interviews yielded that relationships and male peer-to-peer bonding built on students' cultural wealth by providing unique opportunities for learning and self-growth. Implications are offered as well.

Çobanoğlu, F. (2018). Gender Equality in Turkish Higher Education. *International Journal of Higher Education*, 7(5), 91-113.

The moulds of masculinity and femininity determined by society are not only determinants of the way in which individuals behave in society, but also determinants of the production and distribution of the resources. The steady development of societies can be achieved when men and women have the equal power with equal opportunities and resources to shape their own lives and to contribute to their families, societies and countries. The internationally recognized indicators of aforesaid gender mainstreaming are the areas of Economic Participation and Opportunity, Educational Attainment, Health and Survival, and Political Empowerment. In Turkey, even though the legal basis of equality of women and men in these areas have been strengthened through legislative regulations enforced, the need to overcome the obstacles women face when participating to social life as complete and equal individuals and taking all precautions for this is still ongoing. In this study, gender equality in the Turkish higher education system was examined. For this purpose, the schooling rates in higher education, employment rates and participation rates in decision making mechanisms in management of women were examined in the light of gender equality indicators. In this study, which was conducted by document reviewing among qualitative research methods, official websites and documents of international organizations and Turkish official institutions were examined in order to access reliable documents related to Turkish Higher Education and gender equality variables. The survey concluded that while the schooling rates in the Turkish higher education and employment rates of women are high, the proportion of female academicians decreased as the academic degrees increased and that the horizontal disintegration patterns between the scientific areas are more visible on the basis of sub-branches. Furthermore, it has been

found out that women are not adequately represented in decision-making mechanisms, even though they provide the necessary conditions.

Salinas, P., & Romani, G. (2018). Gender Equality or Diversity in the Mining Industry for 2035? Crossroads for Chilean Higher Education. *Journal of Education and Work*, 31(7-8), 628-644.

The objective of this study is to analyse the professional training of the students of mining courses, regarding the career barriers and the strategies to reverse them. Twenty-seven interviews with programme heads and union leaders in the industry were carried out. The results show paradoxical discourses: the programme heads point out that the duty of the students is to adapt to the mining industry 'without crying', but also highlight their skills: orderly, responsible, meticulous; while the union leaders argue that the incorporation of women is a political decision, but not a conviction of the value that women add to the mining industry. They emphasise that higher education must train women to compete on an equal basis with men. In this sense, two educational paradigms emerge: gender equality and/or diversity. In the first, there is a model of 'worker-miner-man' as the unequivocal mentor of the mining industry, while the second questions this model, recognising the contributions of women to the mining industry.

Nash, M., Nielsen, H. E. F., Shaw, J., King, M., Lea, M. A., & Bax, N. (2019). "Antarctica just has this hero factor. . ." : Gendered barriers to Australian Antarctic research and remote fieldwork. *Plos One*, 14(1), 1-22. DOI: 10.1371/journal.pone.0209983

Antarctica is often associated with images of masculine figures battling against the blizzard. The pervasiveness of heroic white masculine leadership and exploration in Antarctica and, more broadly, in Science, Technology, Engineering, Mathematics, and Medicine (STEMM) research cultures, has meant women have had lesser access to Antarctic research and fieldwork opportunities, with a marked increase since the 1980s. This article presents findings from an exploratory online survey examining how 95 women experienced research and remote Antarctic fieldwork with the Australian Antarctic Program. Although women are entering polar science in greater numbers, a key theme of the qualitative findings of this survey is that gendered barriers to participation in research and fieldwork persist. We discuss five key gendered barriers including: 1) Physical barriers, 2) Caring responsibilities/unpaid work, 3) Cultural sexism/gender bias, 4) Lack of opportunities/recognition, and 5) Unwanted male attention/sexual harassment. We argue that the lack of attention paid to gender and sexuality in polar fieldwork contributes to the invisibility and exclusion of women and other marginalized identities broadly. To conclude, we point to the importance of targeted inclusivity, diversity and equity initiatives through Antarctic research globally and specifically by National Antarctic Programs.

Hernandez, P. R., Bloodhart, B., Adams, A. S., Barnes, R. T., Burt, M., Clinton, S. M. ... Fischer, E. V. (2018). Role modeling is a viable retention strategy for undergraduate women in the geosciences. *Geosphere*, 14(6), 2585-2593. DOI: 10.1130/GES01659.1

Gender diversity leads to better science; however, a number of science, technology, engineering, and mathematics (STEM) disciplines, including many geoscience subdisciplines, show a persistent gender gap. PROMoting Geo-science Research, Education, and Success (PROGRESS) is a theory-driven role modeling and mentoring program aimed at supporting undergraduate women interested in geoscience-related degree and career pathways. This study is unique because it is being conducted in a long-term applied setting, rather than as a

laboratory exercise. We compare female STEM majors in PROGRESS to a matched control group (N = 380) using a longitudinal prospective multisite quasi-experimental design. College women in PROGRESS participated in a mentoring and role-modeling weekend workshop with followup support, while women in the control group participated in neither the workshop nor the follow-up support. PROGRESS members identified more female STEM career role models than controls (60% versus 42%, respectively), suggesting that deliberate interventions can develop the networks of undergraduate women. Undergraduate women that participate in PROGRESS have higher rates of persistence in geoscience-related majors (95% versus 73%), although the rates of switching into a geoscience-related major did not differ across groups. More strikingly, we also find that the persistence of undergraduate women in geoscience-related majors is related to the number of female STEM career role models they identify, as their odds of persisting approximately doubles for each role model they identify. We conclude that our ability to retain undergraduate women in the geosciences will depend, in part, on helping them to identify same-gender career role models. Further, the success of PROGRESS points to steps universities and departments can take to sustain their students' interest and persistence, such as hosting interactive panels with diverse female scientists to promote the attainability and social relevance of geoscience careers.

Mello-Carpes, P. B., & Lloret, A. (2018). Women in (neuro)science: report of a meeting held at the University of Valencia, Spain, in February 2018. *Advances in Physiology Education*, 42(4), 668-671. DOI: 10.1152/advan.00113.2018

February 11th is the International Day of Women and Girls in Science. To mark this day, research centers and universities were invited by the Spanish Neuroscience Association to organize a symposium. Twenty-five centers in Spain participated in the event, with the intent of giving visibility to the existing problem of the scarcity of women compared with men in (neuro)science in positions of responsibility and command. Fourteen neuroscientists, all staff members of the University of Valencia arranged the meeting. The morning included lectures by women neuroscientists in different phases of their career: a PhD student, a junior and a senior postdoctoral investigator, and a well-established investigator. In the evening, a roundtable composed of expert women philosophers, STEM (Science, Technology, Engineering, and Mathematics) scientists, and social experts discussed why the gap exists. At the end of the meeting, the exhibition entitled, "Women in Science" commenced: pictures and a brief biography of women who made significant contributions to science were presented. More than 200 people attended the meeting, including the general public, scientists, and secondary school and university students.

Kim, Y. K., & Sax, L. J. (2018). The Effect of Positive Faculty Support on Mathematical Self-Concept for Male and Female Students in STEM Majors. *Research in Higher Education*, 59(8), 1074-1104. DOI: 10.1007/s11162-018-9500-8

Using hierarchical linear modeling, this study examined how positive faculty support is associated with mathematical self-concept development among students in STEM fields and how the association differs for male and female students. The study utilized data from the 2003 Freshman Survey and the 2007 College Senior Survey (CSS) and a sample of 2184 students across 27 baccalaureate institutions nationwide. This study found that positive faculty support was significantly and positively related to STEM students' mathematical self-concept development in general; however, this positive connection held for male STEM students only. Findings also suggested that female STEM students' mathematical self-concept remained significantly below males' throughout college and positive faculty support did not narrow the

persistent gender gap in this area. The study discusses the theoretical and practical implications of the findings.

Potvin, G., McGough, C., Benson, L., Boone, H. J., Doyle, J., Godwin, A. ... Verdin, D. (2018). Gendered Interests in Electrical, Computer, and Biomedical Engineering: Intersections with Career Outcome Expectations. *IEEE Transactions on Education*, 61(4), 298-304. DOI: 10.1109/TE.2018.2859825

Contribution: The current study finds that female-identified students report stronger associations between "helping others" and interest in bioengineering/biomedical engineering than non-females, while they report less interest in electrical and computer engineering overall, with similar associations to factors such as "inventing/designing things" than non-females.

Background: While women have made gains in STEM, electrical and computer engineering programs award 13% of their Bachelor's degrees to women while bioengineering/biomedical engineering programs award over 40%. Prior work suggests that women's persistent underrepresentation in electrical and computer engineering may be due to them being drawn into other disciplines. Women persist in engineering at similar rates as men, so a better understanding of early college attitudes is needed.

Research Questions: 1) How are career outcome expectations associated to electrical engineering, computer engineering, and bioengineering/biomedical engineering? 2) What are females' interests in electrical engineering, computer engineering, and bioengineering/biomedical engineering? 3) Are outcome expectations and major interests distinct for female-identified students?

Methodology: Regression analyses were conducted on multiply-imputed data of introductory engineering students at four public universities in the U.S.

Findings: Students associate inventing/designing things and "developing new knowledge and skills" to electrical engineering, and associate inventing/designing things and "working with people" (negative) to computer engineering. Students associate helping others and "supervising others" (negative) to bioengineering/biomedical engineering. Female-identified students are less interested in electrical and computer engineering, more interested in bioengineering/biomedical engineering, and associate helping others to bioengineering/biomedical engineering more strongly.

Olmedo-Torre, N., Carracedo, F. S., Ballesteros, M. N. S., López, D., Pérez-Poch, A., & López-Bletrán, M. (2018). Do Female Motives for Enrolling Vary According to STEM Profile? *IEEE Transactions on Education*, 61(4), 289-297. DOI: 10.1109/TE.2018.2820643

Contribution: Stereotypes and immediate environment are the reasons for low enrollment of women in STEM studies.

Background: The low number of women in STEM degree courses has been the subject of much research, which has found that the lack of female enrollment is not evenly distributed across all STEM studies. In some areas, such as computing, communications, and electrical and electronic engineering (CCEEE), not only has the number of women not increased, it has even fallen.

Research Questions: Is there a stereotype for women taking STEM studies? Is this stereotype different between women taking CCEEE and non-CCEEE degrees? What are the main reasons that lead women to enroll in STEM studies?

Methodology: A survey was sent to 3699 female students and STEM graduates belonging to the authors' university in six schools with a lowest level of enrollment, and 1060 replies were received. A qualitative study based on data analysis triangulation was performed.

Findings: The women surveyed consider social stereotypes (31.47%) and the immediate environment (14.5%) as the main reasons for the low enrollment of women in STEM studies. Surprisingly, the third reason (11.03%) is that women do not like engineering. New knowledge concerning what motivates female students to enroll in STEM studies, what stereotypes they must struggle against, and the existence of possible differences between CCEEE and STEM but non-CCEEE female students could help policy makers and academia to improve female enrollment in STEM and, in particular, in CCEEE studies.

Gelbgiser, D. & Albert, K. (2018). Green for All? Gender Segregation and Green Fields of Study in American Higher Education. *Social Problems*, 65(4), 564-583. DOI: 10.1093/socpro/spx019

Using the example of green fields of study in higher education, which emerged largely in response to the growing prominence of the environmental movement over recent decades, this article posits that new and emerging fields of study can be an important source of change in gender segregation across fields of study. We suggest that new and emerging fields of study, when framed outside of existing gender divisions, may transcend established gender divisions and be characterized by greater gender integration in both STEM and non-STEM disciplines. Patterns of gender segregation among over 9 million bachelor's degree recipients between 2009 and 2013 confirm that green programs are systematically characterized by greater gender equality relative to non-green fields, regardless of their STEM classification. Further, the more gender imbalanced the "parent" field, the greater the difference we find in the gender composition of green and non-green programs. These results imply that green programs are promoting greater gender equality across the higher education system, underscoring the effect of the organizational structure of higher education, such as the structure of fields of study available to students, on gender segregation in the academy.

Pelch, M. (2018). Gendered differences in academic emotions and their implications for student success in STEM. *International Journal of STEM Education*, 5(33). DOI: 10.1186/s40594-018-0130-7

Background: Understanding student anxiety is an important factor for broadening the gender diversity of STEM majors due to its disproportionate and negative influence on women. To investigate how student anxiety is related to other academic emotions I conducted open-ended interviews with 19 university students and analyzed the data using emergent grounded theory. Emergent grounded theory uses inductive and deductive reasoning to develop a model of cognition and human behavior.

Results: Data analysis led to the development of a detailed theoretical model outlining connections among student anxiety, positive and negative academic emotions, self-regulated learning, and performance. In addition, the data highlight important emotional differences between men and women that have the potential to influence retention in STEM. Specifically, the model elaborates on the concept of a self-deprecating cycle driven by negative academic emotions and suggests that women may be more likely to become trapped in this cycle.

Conclusion: The model incorporates students' emotions as a powerful influence on performance and can be used to inform strategies aimed at changing how university students experience and deal with emotions such as student anxiety.

Zatz, M. (2018). Helping our country as women scientists. *Nature Cell Biology*, 20(9), 1012-1012. DOI: 10.1038/s41556-018-0161-9

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ageing and, more recently, Zika virus and cancer. She has a prolific publication record and is actively involved in ethical aspects of genetic research.

Solanki, S. M., & Xu, D. (2018). Looking Beyond Academic Performance: The Influence of Instructor Gender on Student Motivation in STEM Fields. *American Educational Research Journal*, 55(4), 801-835. DOI: 10.3102/0002831218759034

Recruiting more female faculty has been suggested as a policy option for addressing gender disparities in science, technology, engineering, and mathematics (STEM) fields given its ability to engage female students through a role model effect. While a small but growing body of literature has examined the role of instructor gender at the higher education level, it typically focuses only on academic outcomes. This paper utilizes a unique data set that includes not only information about student course performance in STEM but also a number of motivation-related measures. We find that having a female instructor narrows the gender gap in terms of engagement and interest; further, both female and male students tend to respond to instructor gender. We conclude by discussing the policy implications of these findings.

Pietri, E. S., Johnson, I. R., Ozgumus, E., & Young, A. I. (2018). Maybe She Is Relatable: Increasing Women's Awareness of Gender Bias Encourages Their Identification with Women Scientists. *Psychology of Women Quarterly*, 42(2), 192-219. DOI: 10.1177/0361684317752643

In the current research, we explored whether informing women about gender bias in science, technology, engineering, and mathematics (STEM) would enhance their identification with a female scientist and whether this increased identification would in turn protect women from any adverse effects of gender bias information. We found that, relative to a control information condition, gender bias information promoted beliefs that a successful woman (but not a man) scientist had encountered bias and encouraged identification with that woman scientist. Feelings of empathic concern was an important mechanism underlying this increased identification (Experiments 2 and 3). Moreover, when presented with a man scientist, information about gender bias in STEM decreased female participants' anticipated belonging and trust in a STEM environment, compared to participants in a control information condition (Experiment 1a and 1b). However, identifying with a woman scientist after learning about sexism in STEM fields alleviated this harmful effect. Finally, compared to those in the control condition, women college students who learned about gender bias reported greater interest in interacting with a woman STEM professor at their university (Experiment 3). Our results suggest that interventions that teach women about gender bias in STEM will help women identify with women scientists.

John, T. M., Badejo, J. A., Popoola, S. I., Ool, D. O., Odukoya, J. A., Ajayi, P. O. ... Atayero, A. A. (2018). The role of gender on academic performance in STEM-related disciplines: Data from a tertiary institution. *Data in Brief*, 18, 360-374. DOI: 10.1016/j.dib.2018.03.052

This data article presents data of academic performances of undergraduate students in Science, Technology, Engineering and Mathematics (STEM) disciplines in Covenant University, Nigeria. The data shows academic performances of Male and Female students who graduated from 2010 to 2014. The total population of samples in the observation is 3046 undergraduates mined from Biochemistry (BCH), Building technology (BLD), Computer Engineering (CEN), Chemical Engineering (CHE), Industrial Chemistry (CHM), Computer Science (CIS), Civil Engineering (CVE), Electrical and Electronics Engineering (EEE), Information and

Communication Engineering (ICE), Mathematics (MAT), Microbiology (MCB), Mechanical Engineering (MCE), Management and Information System (MIS), Petroleum Engineering (PET), Industrial Physics Electronics and IT Applications (PHYE), Industrial Physics-Applied Geophysics (PHYG) and Industrial Physics-Renewable Energy (PHYR).

Lockett, A. W., Gasman, M., & Nguyen, T. H. (2018). Senior Level Administrators and HBCUs: The Role of Support for Black Women's Success in STEM. *Education Sciences*, 8(2). DOI: 10.3390/educsci8020048

While it is important for college and university senior administrators to embrace the traditional roles of their administrative positions, senior administrators' interactions with students also shape institutional culture, students' engagement, and ultimately play a role in students' motivation to succeed. This engagement is especially evident in the Historically Black College and University (HBCU) context as senior administrators' engagement with students can directly or indirectly affect how students perceive themselves and their ability to succeed. This article aims to illuminate the role that HBCU senior level administrators play in students' motivation toward success. We also highlight the notion that senior level administrators' role in organizational culture ultimately led historically-disempowered Black women students toward success in even the most historically inaccessible pathways in the science, technology, engineering, and math (STEM) fields. The study used semi-structured interviews with 71 Black women STEM students across 10 HBCUs and asked questions to better understand how events in their lives and on their campuses shaped their choice to pursue and persist through a STEM degree program. The study found that the women were highly motivated by their HBCUs' family-like community of support. Integral to this article, this support was not confined to professors and peers, but extended to senior administrators. We conclude that Black women STEM students' perception of their ability to succeed and their motivation is influenced by the institutions' senior administration.

Ganley, C. M., George, C. E., Cimpian, J. R., & Makowski, M. B. (2018). Gender Equity in College Majors: Looking Beyond the STEM/Non-STEM Dichotomy for Answers Regarding Female Participation. *American Educational Research Journal*, 55(3), 453-487. DOI: 10.3102/0002831217740221

Women are underrepresented in many science, technology, engineering, and mathematics (STEM) majors and in some non-STEM majors (e.g., philosophy). Combining newly gathered data on students' perceptions of college major traits with data from the Education Longitudinal Study of 2002 (ELS: 2002), we find that perceived gender bias against women emerges as the dominant predictor of the gender balance in college majors. The perception of the major being math or science oriented is less important. We replicate these findings using a separate sample to measure college major traits. Results suggest the need to incorporate major-level traits in research on gender gaps in college major choices and the need to recognize the impact of perceptions of potential gender discrimination on college major choices.

Rainey, K., Dancy, M., Mickelson, R., Stearns, E., & Moller, S. (2018). Race and gender differences in how sense of belonging influences decisions to major in STEM. *International Journal of STEM Education*, 5. DOI: 10.1186/s40594-018-0115-6

Background: Women and students of color are widely underrepresented in most STEM fields. In order to investigate this underrepresentation, we interviewed 201 college seniors, primarily women and people of color, who either majored in STEM or started but dropped a STEM major. Here we discuss one section of the longer interview that focused on students' sense of

belonging, which has been found to be related to retention. In our analysis, we examine the intersections of race and gender with students' sense of belonging, a topic largely absent from the current literature.

Results: We found that white men were most likely to report a sense of belonging whereas women of color were the least likely. Further, we found that representation within one's STEM sub-discipline, namely biology versus the physical sciences, impacts sense of belonging for women. Four key factors were found to contribute to sense of belonging for all students interviewed: interpersonal relationships, perceived competence, personal interest, and science identity.

Conclusions: Our findings indicate that students who remain in STEM majors report a greater sense of belonging than those who leave STEM. Additionally, we found that students from underrepresented groups are less likely to feel they belong. These findings highlight structural and cultural features of universities, as well as STEM curricula and pedagogy, that continue to privilege white males.

Lawson, K. M., Kooiman, L. Y., & Kuchta, O. (2018). Professors' Behaviors and Attributes that Promote US Women's Success in Male-Dominated Academic Majors: Results from a Mixed Methods Study. *Sex Roles, 78*(7-8), 542-560. DOI: 10.1007/s11199-017-0809-0

High rates of attrition of women from male-dominated academic majors may stem from both individual-level personal attributes (e.g., lower confidence in skills; Sax et al. 2015) and non-supportive environmental factors (e.g., chilly climate; Blickenstaff 2005; Hill et al. 2010). Grounded in social cognitive career theory (Lent et al. 1994), the present study utilized a mixed methods approach to identify faculty behaviors and attributes that support women in male-dominated majors and help to prevent attrition. In Study 1, data from eight focus groups involving 23 senior women in male-dominated majors at a mid-sized U.S. Midwestern university were coded to identify common themes exploring why certain professors' behaviors/attributes are useful to women in male-dominated majors. Results indicated that professors' behaviors led to learning experiences that helped women create personal connections within departments and provided them with department or career-related information as well as opportunities to gauge/demonstrate their skills to combat the idea that they fit the incompetent-woman stereotype. In Study 2, survey data (n = 65) examined professors' support, academic advising time, and percentage of female faculty within a department as buffers against the negative effects of sexism on women's academic achievement, physical health, and social belongingness. Sexist events in the department were associated with women's reduced sense of belonging, but academic advising time served as a buffer of this association. Overall, our results indicated that proximal environments are important and that professors' behaviors that support women without singling them out were most helpful.

Kuchynka, S. L., Salomon, K., Bosson, J. K., El-Hout, M., Kiebel, E., Cooperman, C., & Toomey, R. (2018). Hostile and Benevolent Sexism and College Women's STEM Outcomes. *Psychology of Women Quarterly, 42*(1), 72-87. DOI: 10.1177/0361684317741889

We examined associations of perceived ambivalent sexism with women's outcomes in university Science, Technology, Engineering, and Mathematics (STEM) courses as a function of their STEM identity. Women (N = 592) who varied in STEM identification reported on their personal experiences with benevolent and hostile sexism and indicated their STEM major intentions, STEM self-efficacy, and STEM grade point average (GPA). Women perceived more

benevolent sexism (i.e., protective paternalism and complementary gender differentiation) than hostile sexism in STEM courses, and their STEM identity moderated the associations between sexism and STEM outcomes. Among weakly-identified (but not strongly-identified) women, protective paternalism predicted lower STEM major intentions, STEM self-efficacy, and STEM GPA; hostile sexism predicted lower STEM GPA. Male STEM students (N = 163) reported more protective paternalism attitudes than hostile sexism attitudes, suggesting that women's perceptions were not without warrant. We discuss implications of these results for understanding women's underrepresentation in STEM and advise STEM educators to avoid well-intended, but paternalistic, messages that convey negative stereotypes about women's STEM competence.

Amarnani, R. K., Garcia, P. R. J. M., Restubog, S. L. D., Bordia, P., & Bordia, S. (2018). Do You Think I'm Worth It? The Self-Verifying Role of Parental Engagement in Career Adaptability and Career Persistence among STEM Students. *Journal of Career Assessment*, 26(1), 77-94. DOI: 10.1177/1069072716679925

Parents contribute a great deal to their children's career development. Despite the central importance of the self-concept to career development, little research has examined the role played by parental engagement in the link between the child's self-concept and career development. Integrating self-verification and career construction theories, we develop and test the prediction that parental engagement indirectly contributes to career adaptability and career persistence by serving as a tacit signal of the child's positive worth. Using a time-lagged survey design, we tested the proposed moderated mediation model in a sample of science, technology, engineering, and mathematics (STEM) university students. The results show full support for the hypothesized model. Consistent with self-verification theory, STEM students' self-esteem was only associated with subsequent career adaptability and career persistence if they also perceived high levels of parental engagement. This result held despite statistically controlling for parent-reported parental engagement. We discuss implications for career development, STEM career persistence, and career counseling.

Ong, M., Smith, J. M., & Ko, L. T. (2018). Counterspaces for women of color in STEM higher education: Marginal and central spaces for persistence and success. *Journal of Research in Science Teaching*, 55(2), 206-245. DOI: 10.1002/tea.21417

Counterspaces in science, technology, engineering, and mathematics (STEM) are often considered safe spaces at the margins for groups outside the mainstream of STEM education. The prevailing culture and structural manifestations in STEM have traditionally privileged norms of success that favor competitive, individualistic, and solitary practices norms associated with White male scientists. This privilege extends to structures that govern learning and mark progress in STEM education that have marginalized groups that do not reflect the gender, race, or ethnicity conventionally associated with STEM mainstream success, thus necessitating spaces in which the effects of marginalization may be countered. Women of color is one such marginalized group. This article explores the struggles of women of color that threaten their persistence in STEM education and how those struggles lead them to search out or create counterspaces. It also examines the ways that counterspaces operate for women of color in STEM higher education, particularly how they function as havens from isolation and microaggressions. Using a framework of Critical Race Theory (CRT) and intersectionality theory and drawing on interview data from 39 women of color about their STEM higher education experiences, we describe five ways in which counterspaces operate: in peer-to-peer relationships; mentoring relationships; national STEM diversity conferences; STEM and non-

STEM campus student groups; and STEM departments. Whereas most research has discussed counterspaces as racially or ethnically homogeneous social groups of peers at the margins, our research found that counterspaces vary in terms of the race/ethnicity, gender, and power levels of participants. We found that counterspaces can be physical settings, as well as conceptual and ideological. Additionally, we identified counterspaces both at the margins and at the center of STEM departments. Thus, our research expands the existing understanding of the types and functions of counterspaces and broadens the definition of what locations can be and should be considered counterspaces.

Piatek-Jimenez, K., Cribbs, J., & Gill, N. (2018). College students' perceptions of gender stereotypes: making connections to the underrepresentation of women in STEM fields. *International Journal of Science Education*, 40(12), 1432-1454. DOI: 10.1080/09500693.2018.1482027

In this study, we surveyed 499 college students at two different universities in the United States to determine what they believe are society's current stereotypes about male and female personality attributes. Data was analyzed using descriptive statistics, Wilcoxon rank-sum tests, ANOVA, and regression. We found that college students do believe that certain personality attributes are stereotypically associated with males while others are stereotypically associated with females within society, and that the strength of these beliefs varied by gender, whether or not they planned to pursue a STEM career, and by parental education. In this paper, we report our findings and relate our results to career choice to better understand how stereotypes might be connected to the shortage of women in many STEM careers.

Alfred, M. V., Ray, S. M., & Johnson, M. A. (2018). Advancing Women of Color in STEM: An Imperative for U.S. Global Competitiveness. *Advances in Developing Human Resources*, 21(1). DOI: 10.1177/1523422318814551

The Problem

The underrepresentation of people of color in science, technology, engineering, and mathematics (STEM) has become a crisis of significant proportion. The crisis is more pronounced when we examine participation by race and gender and explore how these two primary identity dimensions serve to marginalize women of color in STEM fields. These differential representations start during the early years and continue within institutions of higher education and the workplace.

The Solution

To address the absence of women of color in STEM, it is important to understand the forces that hinder and support their career development, beginning with early childhood experiences and throughout education and work environments. Interventions promoting diversity, equity, and inclusion must start in early and secondary education and continue through academia and the workplace.

Stakeholders

Addressing this crisis is the responsibility of leaders of public and higher education and those of business and industry.

Casad, B. J., Petzel, Z. W., & Ingalls, E. A. (2018). A Model of Threatening Academic Environments Predicts Women STEM Majors' Self-Esteem and Engagement in STEM. *Sex Roles*. DOI: 10.1007/s11199-018-0942-4

The present study tested a model of threatening academic environments among a vulnerable population: women in science, technology, engineering, and mathematics (STEM) fields. Women in STEM are underrepresented and more likely to perceive their STEM educational environments as threatening than do men. U.S. Women majoring in STEM fields (n = 579) completed a questionnaire measuring each construct of a model of threatening academic environments proposed by Inzlicht et al. (2009). Supporting the model, greater gender stigma consciousness predicted greater gender-based rejection sensitivity. Gender rejection sensitivity predicted more negative perceptions of campus climate. More negative climate predicted more experiences of stereotype threat, which in turn predicted lower perceived control. Lower perceived control predicted greater disengagement from STEM domains, which predicted lower self-esteem. Differences also emerged between women in male- compared to female-dominated STEM subfields and between racial minority and majority women. This model describes how experiences of threatening environments may contribute to the underrepresentation of women in STEM. The model provides an overview for researchers, educators, and practitioners to better understand the relations among hostile STEM climates, experiences of identity threat, and academic disengagement. Interventions addressing environmental and individual factors in the model may improve retention and women's experiences in STEM.

Freedman, G., Green, M. C., Flanagan, M., Fitzgerald, K., & Kaufman, G. (2018). The Effect of Gender on Attributions for Women's Anxiety and Doubt in a Science Narrative. *Psychology of Women Quarterly*, 42(2), 1-14. DOI: 10.1177/0361684318754528

Although the effect of biases and stereotype threat on women in science, technology, engineering, and math (STEM) fields is well documented, less is known about how men and women attribute an undergraduate woman's anxieties in a STEM class. We examined how undergraduate men and women perceive a woman facing emotional struggles in a physics class (Study 1, N = 309; Study 2, N = 271) and having her contributions ignored in an environmental science class (Study 3, N = 344) in three studies and an internal meta-analysis. Across the studies and meta-analysis, we found gender differences in reactions to the stories. Men were less likely than women to attribute the student's anxiety to bias-related factors, such as awareness of stereotypes or instructor treatment, and more likely than women to attribute the anxiety to the student's lack of preparation. Women were more likely to view the narratives as reflecting real-life experiences of women in STEM. The results indicate a lack of awareness, on the part of undergraduate men, of the difficulties faced by women in STEM classes. Based on the current findings, educators and researchers should consider the role that gender plays in how women's emotional responses in STEM contexts are interpreted.

Leaper, C., & Starr, C. R. (2018). Helping and Hindering Undergraduate Women's STEM Motivation: Experiences with STEM Encouragement, STEM-Related Gender Bias, and Sexual Harassment. *Psychology of Women Quarterly*. DOI: 10.1177/0361684318806302

Prior research indicates many women either leave or pursue science, technology, engineering, and mathematics (STEM) degrees because the social climate undermined or strengthened their motivation and career aspirations. We investigated whether women's experiences of sexual harassment and STEM-related gender bias negatively predicted their STEM motivation (task value, competence beliefs, and perceived costs) and STEM career aspirations. We also tested whether STEM encouragement from friends and family positively predicted motivation and aspirations. To consider domain-specific effects, we also tested the predictors in relation

to non-STEM motivation and career aspirations. Students' grade point average was controlled in all analyses. The sample was undergraduate women enrolled in gateway biology courses for majors (N = 685; M = 19.67 years of age; 35% Asian, 31% White, and 27% Latinx). A majority experienced gender bias (60.9%) or sexual harassment (78.1%) at least once in the past year. STEM-related gender bias from classmates and sexual harassment from instructors (faculty, teaching assistants, or graduate students) were negatively related to STEM motivation and career aspirations. Perceived STEM encouragement from friends was positively related to motivation, and STEM encouragement from friends and family predicted STEM career aspirations. Finally, domain-specific effects were indicated. Our research highlights the need for programs that increase awareness of discrimination, combat bias and harassment, and affirm students' STEM interest.

Parson, L., & Ozaki, O. C. (2018). Gendered Student Ideals in STEM in Higher Education. *NASPA. Journal about Women in Higher Education, 11(2), 171-190. DOI: 10.1080/19407882.2017.1392323*

Using the framework of feminist standpoint theory, this study explored the everyday work of undergraduate STEM students to identify STEM institutional cultural norms and standards that organize and inform the organization of everyday work for undergraduate women majoring in math and physics. Data collection and analysis focused on how the interface between undergraduate women and STEM education was organized as a matter of everyday encounters between students, faculty, and administration through their experiences inside and outside the classroom. Undergraduate participants reported challenges meeting some of the characteristics of successful math and physics students (e.g., taking risks, asking questions, putting school first) and preferred a collectivistic environment. These characteristics are evidence of a masculine STEM institution, which also creates a masculine ideal that women students are expected to meet and exacerbates their discomfort in the STEM environment.

Sarseke, G. (2018). Under-Representation of Women in Science: From Educational, Feminist and Scientific Views. *NASPA. Journal about Women in Higher Education, 11(1), 89-101. DOI: 10.1080/19407882.2017.1380049*

The article aims to explore the main reasons why women are under-represented in science, technology, engineering, and mathematics (STEM) subjects and careers. The article critically analyzes three approaches: educational, feminist, and scientific. This work highlights that the subject "gender and science" has been looked at for at least three decades and the results obtained have not changed significantly. This article concludes that the under-representation of women in STEM has a link with both biological and social-constructivism theory. The possible factors for the dearth of women in the sciences embrace both the influence of socio-cultural factors and the influence of genetics.

Smith, J. L., Handley, I. M., Rushing, S., Belou, R., Shanahan, E. A., Skewes, M. C. ... Intemann, K. (2018). Added benefits: How supporting women faculty in STEM improves everyone's job satisfaction. *Journal of Diversity in Higher Education, 11(4), 502-517.*

Can gender-based diversity programs benefit everyone? We tested whether and how a broadening participation program intended to benefit women working within male-dominated academic fields of science, technology, engineering, and mathematics, may relate to job satisfaction for all who feel involved. Informed by self-determination theory (Deci & Ryan, 2012), we designed and tested a gender-diversity program that supported women faculty's psychological need for autonomy, relatedness, and competence through their involvement in

five activities embedded in three “ADVANCE Project TRACS” (Transformation through Relatedness Autonomy and Competence Support) initiatives. Longitudinal repeated measures collected over 3 years from men and women tenure track faculty across disciplines show that for everyone, involvement with the program predicted a significant positive change in psychological need satisfaction. This change was associated with positive changes in job satisfaction over time. Results demonstrate the success of this particular program, and suggest that diversity programs that target one group can have wide-spread positive impacts on all who feel involved.

Bennett, D., Macarthur, S., Hope, C., Goh, T., & Hennekam, S. (2018). Creating a career as a woman composer: Implications for music in higher education. *British Journal of Music Education*, 35(3), 237-253. DOI: 10.1017/S0265051718000104

Recent decades have seen gender and feminist research emerge as major fields of enquiry in musicology and to a far lesser extent, music education. While these fields have increased awareness of the issues confronting women and other marginalised groups, the pedagogical practices and curricular design that might support aspiring women composers are in urgent need of attention. This article reports from an international survey of women composers (n=225), who in western art music continue to experience a masculine bias that has its roots in the past. The findings in the survey were focused on income, work and learning, relationships and networks, and gender. Numerous composers surveyed noted the under-representation of music composed by women in their higher education curricula. They also described their unpreparedness for a career in music. The article explores the issue of gender in music composition and makes practical recommendations for a more gender balanced music curriculum in higher education.

Munsch, C. L., & Gruys, K. (2018). What Threatens, Defines: Tracing the Symbolic Boundaries of Contemporary Masculinity. *Sex Roles*, 79(7-8), 375-392. DOI: 10.1007/s11199-017-0878-0

A robust literature ties emasculation to a range of compensatory behaviors. The present study shifts focus away from the effects of masculinity threat toward an understanding of young adult men’s experiences of emasculation in their own words. Drawing on 42 in-depth interviews with undergraduate men attending a selective U.S. university, we examine the behaviors, situations, and narratives—both experienced and hypothetical—that privileged young men perceive as threatening. We use these data not only to contribute to the empirical literature on masculinity threat, but also as a novel approach for theorizing about the meaning and structure of masculinity more broadly. This is an important task given recent social and economic changes that may have altered contemporary definitions of masculinity. Emasculation accounts provide unique analytical leverage for revealing men’s often unspoken understandings of acceptable masculine behavior. We find that, while many interviewees superficially espoused egalitarian and anti-homophobic beliefs, their emasculation narratives implicitly call for the subordination of women and other men. These performances consequently obscure and maintain traditional, hegemonic power relations. We discuss the implications of our finding for scholars, practitioners, and individual men who desire a more equitable gender structure.

Simon, R. M., & Nene, K. (2018). The Gender Gap in Physical and Life Sciences: Masculinity, Femininity, Occupational Values, and Chilly Climate. *Sociological Spectrum*, 38(5), 346-369. DOI: 10.1080/02732173.2018.1532365

The underrepresentation of women in science, technology, engineering, and mathematics (STEM) careers is a topic that has received much attention from social scientists. Although women have made considerable progress in science achievement, course taking, degrees earned, and professional positions held over the past four decades (Cunningham, Hoyer, and Sparks 2015; National Center for Education Statistics 2004; National Science Board 2015; National Science Foundation 2008), most of this growth in female representation within the sciences has been confined to the life sciences—biology and medicine—whereas women’s representation in physical, engineering, and mathematical (PEM) sciences remains recalcitrantly low (Boulis and Jacobs 2010; England and Li 2006; Koul, Lerdpornkulrat, and Chantara 2011; National Girls Collaborative Project 2016; National Research Council 2010; National Science Board 2015). Women now constitute more than 60% of bachelor degree recipients in biology but only about 10% of bachelor degrees in electrical engineering (England and Li 2006). Although women represent about half of all persons employed in the life sciences, they make up only about 12% of persons employed as engineers (National Science Board 2015) and about 13% of applicants for tenure track positions in physics (National Research Council 2010). Although the gender gap in STEM careers has been widely researched, the second gender gap—between PEM and life sciences—has received much less attention.

McCutcheon, J. M., & Morrison, M. A. (2018). It’s “like walking on broken glass”: Pan-Canadian reflections on work–family conflict from psychology women faculty and graduate students. *Feminism and Psychology, 28*(2), 231-252. DOI: 10.1177/0959353517739641

Studies on work–family conflict amongst university faculty members indicate that women experience significantly more conflict in balancing their dual roles than their male counterparts. Research suggests that female faculty may be disadvantaged because of the norms structuring academic environments, which seemingly accommodate the life courses of men. Interestingly, the experience of work–family conflict for graduate students, who are besieged by many of the same environmental forces as female faculty, has been largely ignored within the scholarly literature. In the present study, qualitative responses regarding work–family conflict from 65 academic women (32 faculty; 33 graduate students) from universities and colleges across Canada were submitted to thematic analysis. Results revealed three interconnected themes: masculine workplace norms, the need to choose between work and family, and consequences of work–family conflict. The findings point to the need for academic institutions to critically examine their cultures surrounding motherhood in an effort to provide hospitable environments for faculty and graduate students who are, or who will become, parents.

Dresden, B., Dresden, A., & Ridge, R. (2018). The Boys Club: Engineering a More Positive Environment for Women in Male-Dominated Majors. *Social Sciences, 7*(2), 17. DOI: 10.3390/socsci7020017

Sexual harassment has been widely studied in the workforce, but the factors that contribute to hostile educational environments for women have received less attention. The present study focuses on male dominance, gender harassment, gender threats, masculinity, and their influences on creating a hostile environment for women in academia. One hundred and forty-two male participants from a private university in the Southwestern United States self-reported their masculinity, completed a group task with a female confederate leader serving as a gender threat in half the conditions, and had their subsequent affect, perceptions of leadership effectiveness, and behavioral aggression measured. Men from male-dominated

majors and men who had received a gender threat did not differ from men from gender-equivalent majors and men who had not received a gender threat on affect, perceptions of leadership effectiveness, or behavioral aggression ($p_s > 0.201$, $\eta p_2s \leq 0.007$). However, post-hoc analyses revealed that as masculinity increased among men from male-dominated majors under gender threat, they became significantly more behaviorally aggressive ($b = 5.92$, $p = 0.003$) and perceived their female leader as less effective ($b = -0.83$, $p = 0.076$).

Jourian, T. J. (2018). Trans*forming higher education men and masculinity studies: a critical review. *Norma*, 13(1-2), 3-22. DOI: 10.1080/18902138.2016.1260313

White heterosexual cisgender men's narratives saturate the literature on college masculinities, thus far, perpetuating a hegemonic and essentialist definition of masculinity and conflating sex and gender identity and expression. The exclusion of other-gendered masculine voices in turn limits possibilities to destabilize and transform hegemonic masculinity. Additionally, the emergent literature on trans* students presents a dismal outlook for an aggregated population with little if any understanding of how trans* students conceptualize gender. This manuscript provides a critical review of these two expanding strands of literature, calls for more critical interrogations of masculinity/ies from divergent perspectives, such as trans*masculine students, with potential implications to trans*forming masculinities.

Kelley, M. S., & Bryan, K. K. (2018). Gendered perceptions of typical engineers across specialties for engineering majors. *Gender and Education*, 30(1), 22-44. DOI: 10.1080/09540253.2016.1262007

Young women do not choose to be engineers nearly as often as young men, and they tend to cluster in particular specialties when they do. We examine these patterns and the role of gender schemas as applied to perceptions of typical engineers in understanding the choices that women make in terms of engineering specialties. We use Part 1 of two waves of survey data collected from first-year engineering students at a large Midwestern university in the fall of 2014. Respondents scored typical engineers on 60 items from the Bem Sex-Role Inventory [Bem, S. L. 1974. "The Measurement of Psychological Androgyny." *Journal of Consulting and Clinical Psychology* 42: 155–162]. Preliminary results show that women consider the typical engineer to be more masculine compared to the impressions gathered from men. Additionally, engineering gender schemas predict some specialty areas but not all, suggesting that gendered perceptions may not affect choice of specialty. Our results provide insight into the decisions that women make once entering engineering.

Jones, S., & Warhuus, J. P. (2018). "This class is not for you": An investigation of gendered subject construction in entrepreneurship course descriptions. *Journal of Small Business and Enterprise Development*, 25(2), 182-200. DOI: 10.1108/JSBED-07-2017-0220

Purpose: The purpose of this paper is to investigate the social construction of gendered subjects in entrepreneurship education (EEd), through the analysis of course descriptions. For this purpose, the analytical constructs of the Fictive Student and the Fictive Entrepreneur are developed. Design/methodology/approach: Through analysis of 86 course descriptions from 81 universities in 21 countries, this study examines the degree to which course descriptions use gendered language, how such language constructs gendered subjects, and the resultant implications. Findings: This paper finds that course descriptions are predominantly, but not exclusively, masculine in their language. More importantly, the distribution of feminine and masculine language is uneven across course descriptions. Context variables such as regional or

national culture differences do not explain this distribution. Instead, the phenomenon is explained by course content/type; whereby practice-based entrepreneurship courses are highly masculine, compared to traditional academic courses, where students learn about entrepreneurship as a social phenomenon. Practical implications: Universities and educators have not taken into account recent research about the real and possible negative consequences of positioning entrepreneurship in a stereotypical, masculinized fashion. This may offer an inexpensive opportunity to improve recruitment and description accuracy. Originality/value: The paper's contribution is fourfold. First, it contributes to debates on the gendering of entrepreneurship by extending these into EEd. Second, it extends Sarasvathy's (2004) concern with barriers to, rather than incentives for, entrepreneurship to include EEd. Third, it contributes to the emerging literature on entrepreneurship as practice, by highlighting the masculinization of EEd, as it gets closer to practice and the role of language in this. Finally, it highlights the gendered implications of English medium courses.

Hutchins, H. M., & Kovach, J. V. (2018). ADVANCING Women Academic Faculty in STEM Careers: The Role of Critical HRD in Supporting Diversity and Inclusion. *Advances in Developing Human Resources*. DOI: 10.1177/1523422318814547

The Problem: The low representation of women and women of color (WoC) faculty in science, technology, engineering, and mathematics (STEM) academic disciplines represents a critical talent development issue by constraining universities from being truly diverse and inclusive therefore limiting the development and advancement of women scientists. The Solution: We describe the National Science Foundation's (NSF) ADVANCE program as a mechanism for increasing STEM women and WoC faculty career development, inclusion, and advancement. We situate this program as a critical human resource development (CHRD) project and analyze the interventions of ADVANCE Centers at five institutions using a coding scheme based on Acker's theory of organizational gendering. We identify how key interventions address gendered processes and how these efforts align with human resource development (HRD) disciplinary expertise. The Stakeholders: This article will benefit HRD scholars and professionals by identifying how HRD disciplinary expertise can be used to support institutional change efforts focused on faculty diversity and inclusion.

Botella, C., Rueda, S., López-Iñesta, E., & Marzal, P. (2019). Gender Diversity in STEM Disciplines: A Multiple Factor Problem. *Entropy*, 21(1), 30. DOI: 10.3390/e21010030

Lack of diversity, and specifically, gender diversity, is one of the key problems that both technological companies and academia are facing these days. Moreover, recent studies show that the number of female students enrolled in science, technology, engineering and mathematics (STEM) related disciplines have been decreasing in the last twenty years, while the number of women resigning from technological job positions remains unacceptably high. As members of a higher education institution, we foresee that working towards increasing and retaining the number of female students enrolled in STEM disciplines can help to alleviate part of the challenges faced by women in STEM fields. In this paper, we first review the main barriers and challenges that women encounter in their professional STEM careers through different age stages. Next, we focus on the special case of the information theory field, discussing the potential of gendered innovation, and whether it can be applied in the Information Theory case. The working program developed by the School of Engineering at the University of Valencia (ETSE-UV), Spain, which aims at decreasing the gender diversity gap, is then presented and recommendations for practice are given. This program started in 2011 and it encompasses Bachelor, Master and PhD levels. Four main actions are implemented:

Providing institutional encouragement and support, increasing the professional support network, promoting and supporting the leadership, and increasing the visibility of female role models. To assess the impact of these actions, a chi-square test of independence is included to evaluate whether there is a significant effect on the percentage of enrolled female students. The percentage of graduated female students in the information and Communications Technology Field is also positioned with respect to other universities and the Spanish reference value. This analysis establishes that, in part, this program has helped to achieve higher female graduation rates, especially among Bachelor students, as well as increasing the number of top-decision positions held by faculty women.

Rainey, K., Dancy, M., Mickelson, R., Stearns, E., & Moller, S. (2018). Race and gender differences in how sense of belonging influences decisions to major in STEM. *International Journal of STEM Education*, 5(1). DOI: 10.1186/s40594-018-0115-6

Background: Women and students of color are widely underrepresented in most STEM fields. In order to investigate this underrepresentation, we interviewed 201 college seniors, primarily women and people of color, who either majored in STEM or started but dropped a STEM major. Here we discuss one section of the longer interview that focused on students' sense of belonging, which has been found to be related to retention. In our analysis, we examine the intersections of race and gender with students' sense of belonging, a topic largely absent from the current literature. Results: We found that white men were most likely to report a sense of belonging whereas women of color were the least likely. Further, we found that representation within one's STEM sub-discipline, namely biology versus the physical sciences, impacts sense of belonging for women. Four key factors were found to contribute to sense of belonging for all students interviewed: interpersonal relationships, perceived competence, personal interest, and science identity. Conclusions: Our findings indicate that students who remain in STEM majors report a greater sense of belonging than those who leave STEM. Additionally, we found that students from underrepresented groups are less likely to feel they belong. These findings highlight structural and cultural features of universities, as well as STEM curricula and pedagogy, that continue to privilege white males.

Walker, K. A. (2018). Gender Gap in Professional Entomology: Women Are Underrepresented in Academia and the U.S. Government. *Annals of the Entomological Society of America*. DOI: 10.1093/aesa/say030

The majority of professional STEM (science, technology, engineering, and mathematics) scientists are still male, despite increasing levels of female graduates in those areas. Here, I show that, consistent with this pattern, females are significantly underrepresented in entomology positions in academia and the federal government. In both employment sectors, female share of positions also significantly decreases with increasing rank, while the reverse is true for men. At the highest federal government grade level occupied by entomologists, mean salary for females is significantly lower than for males. These results show that female entomologists, despite representing between 40 and 50% of doctoral graduates in the last 10 y, are employed at levels far below their share of graduates and, as such, are underemployed.

Pascale, A. B. (2018). Supports and Pushes: Insight into the Problem of Retention of STEM Women Faculty. *NASPA Journal about Women in Higher Education*, 1–18. DOI: 10.1080/19407882.2018.1423999

Much warranted attention over the past few decades has been devoted to the problem of retaining women faculty in academe, particularly in areas where they are poorly represented

such as in science, technology, engineering, and mathematics (STEM) fields. This study uses descriptive statistics and structural equation modeling techniques to identify factors related to STEM women faculty members' intention to leave. Findings revealed several significant pathways and provide insight into this critical issue. Implications of the findings, in connection with extant research and higher education practices, are discussed.

Posselt, J., Porter, K. B., & Kamimura, A. (2018). Organizational Pathways toward Gender Equity in Doctoral Education: Chemistry and Civil Engineering Compared. *American Journal of Education*, 124(4), 383–410. DOI: 10.1086/698457

Despite gains in baccalaureate and master's degree attainment, women continue to earn lower shares of doctor of philosophy degrees (PhDs) in many fields, a pattern that is often pronounced in science, technology, engineering, and math (STEM). This article uses comparative case study to understand organizational trajectories toward gender parity achieved in two STEM PhD programs—chemistry and civil engineering—in which women have earned significantly higher shares of PhDs than is typical in their fields. Our analysis uncovered a surprising pattern of progress toward parity occurring as an unintended consequence of other changes. Structural reforms implemented to maintain these departments' relevance and stature in changing disciplinary fields had ripple effects that included reducing their gender enrollment gaps in graduate programs. Their trajectories differed, however, and comparing them affirmed the potential of mindful organizational learning as a means of achieving sustainable progress toward equity.

Hilts, A., Part, R., & Bernacki, M. L. (2018). The roles of social influences on student competence, relatedness, achievement, and retention in STEM. *Science Education*, 102(4), 744–770. DOI: 10.1002/sce.21449

Students' perceptions of competence and relatedness are known to influence learning processes and achievement, and may have particular import for underrepresented science, technology, engineering and mathematics (STEM) learners. Sources of social support that contribute to undergraduate life science learners' perceived competence and relatedness were examined, as were achievement and retention outcomes influenced by these sources of support and self-determination theory components. Female, ethnically underrepresented, or first-generation students reported similar levels of perceived competence and relatedness in STEM compared to their majority counterparts at a large, urban university. However, social supports, competence, and relatedness were differentially important for these subgroups as predictors of achievement and intention to leave a science major. For the full sample, competence perceptions predicted greater achievement and lessened intentions to leave a major. Competence perceptions were primarily derived from contact with classmates, especially for underrepresented groups. Feelings of relatedness were specifically important for the retention of women pursuing science degrees. Contacts with STEM peers and classmates were sources of relatedness for majority groups, but classmate contact was not significant for underrepresented groups. Findings highlight the value of promoting competence and relatedness and the differing sources that these subgroups draw on to build the perceived competence and relatedness that can predict achievement and retention.

Leath, D., & Chavous, T. (2018). Black women's experiences of campus racial climate and stigma at predominantly white institutions: Insights from a comparative and within-group approach for STEM and non-STEM majors. *Journal of Negro Education*, 87(2), 125-139.

The present quantitative study examined racial climate, racial stigmatization and academic motivation among racially diverse women from a predominantly White university. The authors used a comparative lens to highlight how Black women's experiences compared to Women of Color and White women, and a within-group design to contextualize Black women's experiences as a unique group. The authors also explored how Black women's racialized experiences and motivation beliefs varied across STEM and Non-STEM majors. Overall, Black women experienced a more hostile racial climate and less academic satisfaction than women from other racial/ethnic groups. Black women reported similar levels of academic competence, suggesting their determination to excel despite experiencing race-related challenges in their institutional context. Finally, racial stigmatization was negatively associated with academic motivation.

Sarathchandra, D., Haltinner, K., Lichtenberg, N., & Tracy, H. (2018). "It's Broader than Just My Work Here": Gender Variations in Accounts of Success among Engineers in U.S. *Academia. Social Sciences*, 7(3), 32. DOI: 10.3390/socsci7030032

Among science, technology, engineering, and math (STEM) disciplines, the percentage participation of women in engineering has shown significant gains over the past few decades. However, women are still largely absent (or exist in very small numbers) in tenured academic ranks in several engineering sub-fields. In this study we present female and male engineers' varying understandings of 'scientific success' as a potential contributor to women's retention and success in their (sub)fields. Using in-depth interviews conducted among engineering graduate students and faculty at two U.S. Northwest land-grant research universities, this study demonstrates the 'dual' nature in accounts of scientific success, where formal measures of success operate in tandem with informal measures. While both men and women attribute their success to formal and informal measures, gender-based variations tend to be more prevalent among informal measures. By examining these informal measures, this study highlights the context surrounding success.

Turner, T. R., Bernstein, R. M., Taylor, A. B., Asangba, A., Bekelman, T., Cramer, J. D. ... Vogel, E. (2018). Participation, representation, and shared experiences of women scholars in biological anthropology. *American Journal of Physical Anthropology*, 165, 126–157. DOI: 10.1002/ajpa.23386

American Association of Physical Anthropologists (AAPA) membership surveys from 1996 and 1998 revealed significant gender disparities in academic status. A 2014 follow-up survey showed that gender equality had improved, particularly with respect to the number of women in tenure-stream positions. However, although women comprised 70% of AAPA membership at that time, the percentage of women full professors remained low. Here, we continue to consider the status of women in biological anthropology by examining the representation of women through a quantitative analysis of their participation in annual meetings of the AAPA during the past 20 years. We also review the programmatic goals of the AAPA Committee on Diversity Women's Initiative (COD-WIN) and provide survey results of women who participated in COD-WIN professional development workshops. Finally, we examine the diversity of women's career paths through the personal narratives of 14 women biological anthropologists spanning all ranks from graduate student to Professor Emeritus. We find that over the past 20 years, the percentage of women first authors of invited symposia talks has increased, particularly in the sub-disciplines of bioarchaeology, genetics, and paleoanthropology. The percentage of women first authors on contributed talks and posters has also increased. However, these observed increases are still lower than expected given the percentage of

graduate student women and women at the rank of assistant and associate professor. The personal narratives highlight first-hand the impact of mentoring on career trajectory, the challenges of achieving work-life satisfaction, and resilience in the face of the unexpected. We end with some suggestions for how to continue to improve equality and equity for women in biological anthropology.

Seeley, J. L. (2018). 'Show us your frilly, pink underbelly': Men administrative assistants doing masculinities and femininity. *Gender, Work & Organization*, 25(4), 418-436.

Research on men tokens (or numerical minorities) at work has focused on the processes by which men try to claim hegemonic masculine identities for themselves and how workplace interactants support or reject these attempts. In contrast to masculinity studies, token theory has paid less attention to non-hegemonic masculinities. Using interviews with men administrative assistants, I develop a more comprehensive understanding of men tokens' gender performances and their significance for gender inequality. I present a four-part typology: hegemonic masculinity, alternative masculinity, critical masculinity and male femininity. The categories are differentiated along two axes: support for hegemonic masculinity and support for hierarchical, binary gender.

Borgkvist, A., Moore, V., Elliott, J., & Crabb, S. (2018). 'I might be a bit of a front runner': An analysis of men's uptake of flexible work arrangements and masculine identity. *Gender, Work & Organization*, 25(6), 703-717.

In most western countries, men's use of flexible work arrangements (FWA) is low. Intersections of gender and organizational culture are likely to contribute to this circumstance but have received little attention. This research aims to investigate men's experiences of FWA use and non-use to understand contextual factors influencing men's decisions and how men construct their identities in relation to work, parenting and FWA. Based on semi-structured interviews with 15 men, discourse analysis identified that workplace culture and the ideal worker norm strongly influence men's decision making regarding FWA use, and feature in identity construction. Most men adhered to traditional constructions of masculinity in their talk, even when utilizing FWA which was constructed as an individual choice and a privilege. Some men constructed themselves as 'ground-breakers' but still used traditionally masculine attributes to achieve this. Overall, the results highlighted a need to encourage societal and organizational support for men's FWA use.

Starr, C. R. (2018). "I'm Not a Science Nerd!" STEM Stereotypes, Identity, and Motivation among Undergraduate Women. *Psychology of Women Quarterly*, 42(4), 489-503.

Stereotypes reduce women's identification with science, technology, engineering, and math (STEM), which can decrease their motivation to enter STEM domains. Stereotypes may be gender-based (e.g., STEM is for men) or trait-based (e.g., STEM is for geniuses). In this study, I explored two primary research questions: First, would stereotyping STEM as a domain for nerdy geniuses negatively relate to women's STEM identity? Second, would STEM identity mediate the relation between stereotypes and STEM motivation? Nerd-genius stereotypes and gender stereotypes negatively contributed to women's STEM identity. STEM identity positively contributed to women's STEM motivation (including expectancy-value beliefs). Participants were a diverse sample of undergraduate women ($N = 195$, mean age was 19.8; 30% of participants were Latina, 30% European, 24% Asian). Stereotype measures were (1) implicit

gender-STEM associations, (2) explicit gender associations about STEM, and (3) a new scale that measured nerd-genius stereotypes. The results highlight the unique contribution different stereotypes make toward women's identification with STEM and, in turn, their motivation to pursue STEM pathways. Practice implications include addressing nerd-genius stereotypes in STEM interventions and reducing classroom artifacts that might be reminiscent of these stereotypes.

Ehrlinger, J., Plant, E. A., Hartwig, M. K., Vossen, J. J., Columb, C. J., & Brewer, L. E. (2018). Do Gender Differences in Perceived Prototypical Computer Scientists and Engineers Contribute to Gender Gaps in Computer Science and Engineering? *Sex roles*, 78(1-2), 40-51.

Women are vastly underrepresented in the fields of computer science and engineering (CS&E). We examined whether women might view the intellectual characteristics of prototypical individuals in CS&E in more stereotype-consistent ways than men might and, consequently, show less interest in CS&E. We asked 269 U.S. college students (187, 69.5% women) to describe the prototypical computer scientist (Study 1) or engineer (Study 2) through open-ended descriptions as well as through a set of trait ratings. Participants also rated themselves on the same set of traits and rated their similarity to the prototype. Finally, participants in both studies were asked to describe their likelihood of pursuing future college courses and careers in computer science (Study 1) or engineering (Study 2). Across both studies, we found that women offered more stereotype-consistent ratings than did men of the intellectual characteristics of prototypes in CS (Study 1) and engineering (Study 2). Women also perceived themselves as less similar to the prototype than men did. Further, the observed gender differences in prototype perceptions mediated the tendency for women to report lower interest in CS&E fields relative to men. Our work highlights the importance of prototype perceptions for understanding the gender gap in CS&E and suggests avenues for interventions that may increase women's representation in these vital fields.

Moss-Racusin, C. A., Sanzari, C., Caluori, N., & Rabasco, H. (2018). Gender bias produces gender gaps in STEM engagement. *Sex Roles*, 1-20.

We explored whether the existence of gender bias causes gender gaps in STEM engagement. In Experiment 1 ($n = 322$), U.S. women projected less sense of belonging, positivity toward, and aspirations to participate in STEM than did men when exposed to the reality of STEM gender bias. These gender differences disappeared when participants were told that STEM exhibits gender equality, suggesting that gender bias produces STEM gender gaps. Experiment 2 ($n = 429$) explored whether results generalized to a specific STEM department, and whether organizational efforts to mitigate gender bias might shrink gender gaps. U.S. women exposed to a biased chemistry department anticipated more discrimination and projected less sense of belonging, positive attitudes and trust and comfort than did men. These gender differences vanished when participants read about an unbiased department, again suggesting that gender bias promotes STEM gender gaps. Further, moderated mediation analyses suggested that in the presence of gender bias (but not gender equality), women projected less positive attitudes and trust and comfort than did men *because* they experienced less sense of belonging and anticipated more discrimination. Results were largely unaffected by whether departments

completed a diversity training, suggesting that knowledge of diversity initiatives alone cannot close STEM gender gaps.