GENDER INEQUALITY IN STEM FIELDS AND BEYOND: THE CASE FOR ENGAGING MEN AND BOYS

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FOREWORD

“Gender Equality in STEM Fields and Beyond: The Case for Engaging Men and Boys” is part of the White Paper Series produced by the Center for the Study of Men and Masculinities at Stony Brook University. These White Papers are intended to summarize some set of empirical findings on a particular issue or question, or facilitate a conversation between activists and researchers.

Given the recent controversies about gender equality in STEM fields, we believe it is an important contribution to examine the empirical evidence, especially from the literature on gender socialization, of the positive value of engaging boys and men.

We are often told that remedies for gender inequality at work – whether in recruiting, retention, or promotion – are to be found by “going way back” to earliest childhood. This white paper suggests some of the effective pressure-points in gender socialization that can challenge gender stereotypes, expand the pipeline and create more gender equal workplaces in the STEM fields.

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EXECUTIVE SUMMARY

Gender equality is everybody’s issue. Research shows that gender equality makes people – men, women, and their children – happier, healthier, and more productive. When education and occupations are more gender equal, employers attract better employees, reduce costs associated with staff turnover, and increase their corporate social responsibility. Fortune 500 companies with the most female managers boast returns 34% higher than their male dominated counterparts. For the economy as a whole, increasing female labor force participation could increase American GDP by 5%. Yet, despite broad social changes that have increased the participation of women in the public sphere, some fields and occupations continue to be gender segregated. Women earn the majority of undergraduate degrees, yet they also do the majority of household work, and are concentrated in lower status, lower paying jobs, even in high-status fields. Gender inequality in science, technology, engineering and mathematics (STEM) fields is a case in point of the “stalled revolution,” the intransigence of gender inequality in spite of advances in women’s status and the stunning innovations of science and technology. Excluding women from STEM does not only shortchange women at the forefront of technology and undermine the productivity and creativity of STEM firms, it also creates gender inequality in the vast majority of professional fields. In the future, 90% of jobs will require STEM skills. Excluding women means reversing gains in gender equality, a change that hurts everybody.

This report reviews contemporary research on factors contributing to gender inequality in STEM fields. Because of the increasing relevance of STEM to the economy at large, understanding gender inequality within STEM studies and firms is crucial to anticipating and mitigating gender inequality in the future. This report joins a growing conversation that moves beyond getting more women into “the pipeline” to instead challenge the stereotypes, cultures, and structures that hinder the diversity and success of even the top STEM firms today. Rather than encouraging more women to assimilate to a masculine culture of work, this research identifies opportunities to change that culture, creating more inclusive, creative, and productive workplaces. Importantly, this process starts early, often in childhood, and, just as importantly, it involves both boys and girls, both men and women.

Throughout childhood, adolescence, and college, girls and boys, women and men, are subject to and internalize gendered ideas about STEM preference and ability. Girls are discouraged from activities that would prepare them for STEM studies and careers, and experience unsupportive treatment at all levels of education. For example, both parents and teachers assume that girls are less interested in science and math, and girls typically develop preferences accordingly. Toys and games encouraged for girls don’t instill hands-on aptitudes to give them confidence in these fields, and almost no role models exist in popular media to showcase women or girls in STEM. The result is that, despite proving equally adept at science and math in early adolescence, girls rate their abilities, and thus their enjoyment, far lower than boys do. At the very same age girls tend to lose their voices and feel increased pressure to conform to feminine gender norms. These disadvantages are not inevitable, or
irreversible. Hands-on lab opportunities for girls allow them to build their confidence and basic skills for STEM.20 Furthermore, girls who learn about gender discrimination in STEM fields are more likely to show an interest in science.21

Boys, on the other hand, see themselves in STEM from an early age.22 They develop competence through childhood play and confidence through encouragement from parents, teachers, and the media. Parents are often particularly concerned with raising their boys as masculine, promoting STEM while limiting alternative interests for boys.23 Even from a very young age boys describe science in masculine terms and picture themselves working in STEM fields.24 Boys’ increased exposure to video games and science- and engineering-related toys give them foundational language and facility in STEM that girls are typically denied.25 Adolescence also introduces the “Boy Code” for many young men, an inauthentic and anxiety-laden set of rules about masculinity that boys feel pressured to follow.26 In order to establish their masculinity, boys learn to distance themselves from anything feminine, thus incentivizing the exclusion of girls from STEM, and maintaining the male-dominance of the field.

These ideas about gender produce unequal outcomes at each stage of the pipeline, inequalities that are exacerbated and reproduced in work and family life.27 College programs tend to emphasize individual, rather than group- or discussion-based,28 work, use excessive jargon,29 and reward intellectual ‘risk-taking’.30 For girls who may have less experience, security, and confidence than boys, this educational setup hinders their participation and success.31 Rather than building a common knowledge foundation for all students, or using plain language to create more inclusive classrooms, women college students face very narrow and high expectations.32 They either have to perform flawlessly, indeed, better than the men, or they need to be pretty, reinforcing the idea that women are not doers, they’re decor.33 In either case, women face an uneven playing field. Highly selective institutions, those that feed into the top STEM firms in Silicon Valley, tend to be the worst for women.34 However, these trends can be changed. Harvey Mudd, for example, vastly increased the enrolment and success of female students through adjustments to teaching and recruitment strategies that challenge and broaden masculine stereotypes associated with STEM.35

Nevertheless, this research shows that getting more women into colleges and workplaces is necessary but not sufficient to achieve gender equality. A change in the culture of these institutions must take place, and it must engage men. Women have made remarkable advances in every field they have entered, but men are often overlooked. Close study finds that root causes of gender inequality in STEM are not only due to the lack of role models and confidence for women and girls, but to the overemphasis of masculine stereotypes and masculinities in parenting,36 schools,37 and workplaces.38 Men are necessary to tackle these barriers to gender equality, and there are many entry points through which to do so. Men, especially those in positions of authority, can begin by working as mentors, rewarding and recognizing the work of women, or sending male staff to conferences that focus on the contributions of women scientists. Even more so, men can identify and resist unequal and harmful masculine cultures that promote stereotypes, bias, and extreme work environments.39 Men are in a unique position to do so.

The good news is that men stand to benefit. Men themselves report struggles balancing work and family40 and feel they must remain silent in the face of these challenges.41 If men and women stand together to challenge and change masculine norms in the workplace that are harmful to men’s health42 and families,43 and systematically hinder the progress of women, broad-based and inclusive change can advance gender equality. These changes will also improve the competitiveness of workplaces in a global economy.44 Work can be reorganized to balance risk-taking achievements with valuing other demonstrations of skill and effort; expectations of employees can be shifted so that extreme work hours and high-stress assignments become the exception rather than the norm; team-building can improve relationships between male and female staff; and workplaces can actively survey at every level of the organization for ways to address barriers to gender equality. The benefits of gender equality – to individuals, families, firms, and the economy - are proven, if men and women work together. The responsibility is everyone’s. So are the benefits.
PART 1: CONTEXT

Gender equality – it’s a women’s issue, right? Well, what about when 90% of all employees in major American corporate firms – both men and women – say that they are afraid to take extended parental leave because they think it will hurt their careers?45 What about when research shows that gender equality makes people – both men and women (and their children, too)- happier,46 healthier,47 and more productive?48 Nevertheless, it is commonly assumed that women are the sole beneficiaries and the sole agents of change when it comes to gender equality. Heretofore women have made astounding progress, and they continue to do so. Men’s roles in the movement have been less well understood, but recent research shows that men are not only essential partners in the movement for gender equality, but also stand to benefit in their work and family lives.49

Women are outnumbered in the workplaces of the best paying and most highly regarded fields, including corporate America,50 the financial sector,51 and science, technology, engineering, and math (STEM) fields.52 STEM fields are not only crucial for the competitiveness of the American economy,53 they are increasingly integrated into mainstream jobs. The Executive Director of UN Women recently reported that 90% of jobs in the future will include STEM skills or applications.54 No matter their interests, men and women will need STEM acumen to thrive in tomorrow’s economy. The exclusion of women from STEM could thus result in a worsening of gender inequality as the economy evolves. Gender inequality in wages, occupations, and social status, persists despite broad social changes that have increased the participation of women in the public sphere,55 and the explosion of interest and research in gender studies.56 Women earn the majority of undergraduate degrees,57 yet they also do the majority of household work. Furthermore, they remain concentrated in lower status, lower paying jobs, even in high status fields.58

The current status of women and work is a clear and dramatic statement that progress toward equality is neither linear, nor predictable. Indeed, the percentage of women undergraduates studying computing has dropped steadily since its peak the early 1980s.59 What is more, only one or two centuries ago, the sciences were considered feminine fields of study, and the arts were reserved for men.60 Yet today, the United States, a highly modern country by many measures, lags far behind other countries in the proportion of women earning science degrees.61 What is particularly perplexing about gender inequality is that it shows up in some of the least expected places – those that are at the forefront of innovation. STEM fields are a case in point. They are at the cutting edge of technological progress, yet a laggard in gender equality. What explains this contradiction? What are the forces at play that keep women out of STEM in the first place, and hamper their success and advancement when they make it to the workplace? Moreover, while the question is often posed - why are there so few women in STEM, we pose the corollary - why are there so many men?

In this review, we analyze the effects of gender for both men and women in early educational experiences up to choosing and persisting in college degrees, experiences and identities in workplace cultures, and engagement with organizational policies and structures. These various points of entry allow us to better understand and ameliorate gender inequality in STEM fields. While these three areas are mutually reinforcing, this review emphasizes early experiences and socialization to complement other research and interventions currently targeting the workplace. Recommendations for interventions or further research are marked in bullet points throughout the review.

PART 2: SOCIALIZATION: BECOMING GENDERED INDIVIDUALS

Gendering – responding to social sanctions that reward or punish behaviors for girls and boys, women and men, is ongoing. From early childhood to middle school, college to the workplace, parenting to retirement, individuals continually respond to gendered social cues about how to behave and what attitudes to hold in different social contexts.62 These responses become ingrained, though not immutably, overtime, dictating personality traits, preferences, and skills that have significant effects on life outcomes. Importantly, not all men are alike, nor are all women. Individuals have unique social identities comprised of gender, race, and class, as well as other salient characteristics and life experiences.63 These characteristics are most interesting when patterns emerge. Patterns signal that certain traits have consistent effects across groups. In many cases these effects result in unequal life chances.
Because of the uniqueness of individuals, it can be tempting to assume that each individual follows their own path and that providing equal opportunities is the best way to allow for diversity to flourish. According to Phillips, however, when uniform opportunities consistently result in unequal outcomes, the opportunities were probably not that equal in the first place. When inequality maps onto social groups, rather than randomly across individuals, it is likely that the disadvantaged group, on average, is prohibited from equal participation in the opportunities available. Gender inequality in STEM, shaped as it is by race and class positions, proves this very point. And the process starts early.

**Childhood**

Despite popular belief, there is little innate about gender. Gender differences and inequalities are learned from multiple sources and reinforced by cultural value systems and structural circumstances. Indeed, the process of gendering individuals starts before birth, when parents anticipate what their children will be like and how to treat them. Given the gendering forces from all sides, is it any wonder that children themselves absorb and reproduce these ideas? As early as 3 years, children demonstrate stereotypical preferences, girls with dolls, boys with trucks, but these preferences tend to reflect the expectations and reinforcements children receive from peers, parents, teachers, and the media. These pressures are uneven. A recent study found that parents were three times as likely to reinforce masculine behaviors in sons than feminine behaviors in daughters. Although this suggests a loosening of feminine codes of conduct on girls, without a commensurate change in masculinities, gender equality will be stalled. Encouraging gender equality from a young age, then, requires challenging narrow forms of masculinity and promoting greater variety of expression and preference for all children. This also involves more mixing between young boys and girls which reduces ideas about gender difference.

- Encourage toys and games that build early STEM interests and aptitudes for girls.
- Integrate gender awareness in parenting workshops, especially challenges to rigid codes of masculinity.
- Conduct longitudinal evaluation of these programs.

**Gender at School**

A number of studies examining performance in science and math find no difference between competence and achievement levels between boys and girls. Where results diverge are in the levels of confidence each gender has in their abilities. Boys consistently report higher self-perceptions of their abilities even when boys and girls earn the same score. As Charles writes, "believing in difference produces difference." Boys believe they are competent in science and math, contributing to their enjoyment and persistence in these fields. Girls, especially girls of color, learn early that math and science is not "for them" and adjust their preferences accordingly. They are not alone in these judgments. Parents are less likely to think their daughters are interested in science; the media almost never portrays role models for girls in science and math; and children's toys provide early hands-on activities for boys to relate to science, but do not provide the same opportunities for girls. Indeed, play activities for boys like building and computer games may provide early learning-by-doing opportunities to build their affinity for STEM fields. When girls have similar lab and hands-on opportunities in school, the gap between girls and boys narrows. More than just playing with blocks, children are actively gendering their games as they grow. Jones's study found that sixth-grade boys described science as "destructive" and "dangerous," both masculine-typed traits. Likewise, girls tend to frame their interests in feminine terms of helping people or altruism, values that are less salient in the marketing of STEM.

- Introduce female STEM role models in media for both girls and boys.
- Evaluate the effects of non-traditional female role models on boys’ attitudes.
- Increase hands-on and lab opportunities for girls.
- Make early connections between girls’ interests and STEM studies.
• Provide diverse examples and applications of STEM to challenge the masculine associations of science as “destructive.” Demonstrate how STEM skills are relevant to the majority of occupations, not just a narrow technical field.

Adolescence
Socialization sharpens as children reach adolescence when gender differences and inequalities become more salient. Girls often lose their voices at this age. Boys, on the other hand, gain theirs, albeit a voice shot through with the anxieties of trying to prove their masculinity. And yet, this process is neither categorical, nor inevitable. For example, Harter highlights the role of encouragement from peers and role models to support girls’ voices. Another study found that an intervention to increase girls’ interest in science had no effect on their attitudes towards science, whereas a comparison intervention that included information on gender discrimination increased girls’ self-efficacy and belief in the value of science. Indeed socialization does not condemn individuals to gender inequality. There are opportunities for girls and boys, women and men, to live more gender equal lives with the right information, opportunities, and support.

• Provide encouragement and role models for girls.
• Educate girls and boys about gender discrimination.
• Girls have shown greater interest in science after learning about gender discrimination. Conduct new research on the effect on boys.

Just as girls are increasingly aware of their gender identities, corollary processes are taking place for boys, varying by social group. Archer et al. find that social class affects whether boys feel they belong in scientific careers. Working-class boys are much less likely than their middle-class counterparts to see themselves in these occupations. In fact, class represents a broader barrier to achievement for boys where working-class masculinities may run counter to the values needed to succeed in school. While boys in general are considered to be advantaged in STEM fields, and tend to report higher levels of confidence and enjoyment, only certain boys, usually those with class privilege and high expectations of their achievement, such as white and Asian boys, reap the benefits. Similarly, experiences of girls and boys of color differ from each other and from their white counterparts. In a nationally representative sample of eighth grade students, white and Hispanic girls were about half as likely as white boys to aspire to an occupation in math regardless of their enjoyment or achievement in the subject. Black and Hispanic boys were equally likely to aspire to a career in science or math, but less likely to achieve at the same level as white boys. These indicators show that gender is not the only story in determining who succeeds in STEM fields.

• Neither all boys, nor all girls, have identical socialization experiences. Provide supports such as tutoring and mentoring for underrepresented groups.
• Develop interventions to challenge the stereotype that middle-class white and Asian men are ‘naturally’ good at STEM studies, boosting the confidence of other groups.
• Provide female role models for both girls and boys.

What these tales of child and adolescent socialization tell us is three-fold.
1. Not all men and women are alike, and differences between them by social location (such as race and class) and in life experience (parental encouragement or hands-on experience) shape the self-concepts of boys and girls and their aspiration to careers in STEM fields.
2. Many girls, and working-class or non-Asian boys of color, may never make it to "the pipeline" into STEM college programs and careers. Combinations of opportunities, confidence, role models, and achievement may limit their interest or access to these fields.
3. Perhaps most importantly, these early experiences shape how boys and girls see themselves and interact with the world around them. These experiences have both deep and immediate effects. Studies have shown that girls will perform worse on tests when
primed with stereotypes that women are less capable at the task at hand. When they are primed with the belief that men and women can perform equally well, they do much better. Accordingly, increasing the number of women or minorities in the pipeline is necessary but not sufficient. Stereotypes about ability and belonging have lasting effects on individuals and are often reflected and reproduced by their schools, workplaces and organizational logics. The following sections outline these effects.

PART 3: COLLEGE STEM PROGRAMS: BOTTLENECKS AND OPPORTUNITIES

Students entering STEM programs in college bring along gendered attitudes and behaviors that are shaped by the cultures and conditions of their institutions. Despite advances in gender equality, women feel pressured to reproduce stereotypes in order to be accepted in their fields. In male-dominated spaces, men experience more latitude in their expressions of masculinity whereas women are expected to follow much narrower scripts. In one study of STEM college students in Denmark, women students who could not be “one of the guys,” which required them to perform at the highest level of competence (a standard, incidentally, that was not applied to men students), could only gain acceptance if they were physically attractive. The same study found that the college culture encouraged high levels of technical jargon which often excluded women students who did not share the men’s history of computing and gaming. In addition, as minorities, women were less secure and thus averse the creative problem-solving and risk-taking behavior that was rewarded in their male colleagues. Interestingly, when women are in the minority, they were expected to either assimilate to the male norm, or gain acceptance through their appearance, but when male students were the minority, as in molecular biomedicine, men negotiated their minority status by acting out in masculine ways – being loud and outspoken, aloof, and informal. Even where women were the majority, then, men students were valued for their masculinity. Women in this study were discouraged from discussing assignments with classmates, a learning strategy associated with persistence of women in STEM degrees. This finding contradicts the notion that simply adding more women without attending to social and institutional contexts will solve gender inequality in STEM fields.

• Numbers are not the only issues. Discriminatory cultures and expectations prevail even when women are in the majority.
• Reduce the use of unnecessary jargon in classrooms.
• Build the capacities of students who lack experience with gaming or computing before arriving in college.
• Encourage group-work and discussion.
• Balance assignments that reward creative risk-taking with other performance metrics.

Contrary to conventional wisdom, there is little evidence that female faculty members improve the chances of women students persisting in STEM studies. Some studies even find that women students are less likely to persist under the tutelage of a female professor. There is some evidence, however, that black students have an increased likelihood of persistence when taught by a black professor. Perhaps most surprising is that highly selective institutions are negatively associated with women’s persistence in STEM degrees. Teaching institutions with smaller research portfolios better serve women and minorities. Crucially, these are precisely not the schools that feed into Silicon Valley, the hotbed of STEM innovation. Chief feeder schools include Stanford, Harvey Mudd, Massachusetts Institute of Technology (MIT), Yale, Duke, Dartmouth, Princeton, Harvard and Brown, none of which are small teaching colleges. What these patterns begin to illuminate is how institutions themselves, while appearing to be meritocratic, may in fact reinforce inequality along gendered, raced, and classed lines. If women students and minorities are disadvantaged by highly selective institutions which are the very same institutions that provide pathways to Silicon Valley, even those who persist through middle- and high-school, and into STEM studies in college face an additional challenge to excel and make it to the workplace. Those who do make it, however, face their own set of hurdles.
• Highly selective colleges should invest more in teaching and student support (rather than strictly research portfolios).
• STEM firms should consider alternative institutions with stronger teaching records when recruiting talent.

PART 4: WORKPLACE CULTURE: MERITOCRACY AND MASCULINITY
The socialization literature demonstrates that stereotypes frequently reproduce themselves. In the workplace, two forces are at work.

1. Treating all employees as "the same" by applying meritocratic standards that obscure differences in experience and evaluation contribute to gender inequality. Uniform standards are also not immune to gender bias. For example, STEM employers have been found to select for hire a résumé with a man’s name compared with an identical résumé with a woman’s name. The criteria are the same, but unconscious bias favors the male candidate. STEM employers are likewise almost fifteen times more likely to hire a lower-performing woman.

2. Treating women and men as distinctly different in their abilities or ambitions similarly produces gendered difference. For example, the widely held belief that men work with things, while women work with people, undervalues the contributions of women in STEM. A balance that genuinely values women’s experiences is important.

The tension between similarities and differences between men and women presents a bind that workplaces struggle to ameliorate, often through equality policies or training programs for staff. However, it is the culture of the workplace that weaves gender difference into the fabric of personal interactions and assumptions about employees. Policies are vastly reduced in their effectiveness if workplace cultures impose negative sanctions on those who take advantage of these policies. The opening statistic in this review, that 90% of both male and female staff in corporate firms fear damage to their career if they take extended parental leave, proves this point. Women have learned throughout school that they are interlopers in a male space and that they should minimize their differences as much as possible. And yet they have also been measured by different metrics, often undermining their sense of job security and their opportunities for advancement.

Because the current state of STEM assumes a male norm, men may be less aware of biases in the workplace that typcast women as “warm” but less competent, or appeal to metaphors and jargon that play on masculine themes like sports. People in highly successful positions, including women, although there are fewer of them at the top, are more likely to see their success as based on merit, not stereotype. Indeed, just as many women have learned that they are less capable and don’t belong in STEM, men have learned that they are more capable and entitled to key positions in the field. Although women are just as hard working as their male peers, they lose motivation if they perceive that they must try harder than their male colleagues to succeed. And in fact, women often actually work harder than men because they have to endure a culture that devalues them. Many STEM workplaces are fueled by a brand of “nerd masculinity” through which (potentially emasculated) men can recuperate gendered power through the exclusion of women and the performance of high levels of competence in technical fields. Nerd masculinity, however, is not just about “being a man” in STEM, it’s also about shoring up heterosexuality in male-dominated spaces. In a lab or a boardroom full of men, treating women as sexual objects allows men to affirm heterosexuality. This may explain why so many women in STEM experience sexist behavior and sexual harassment. Indeed, a recent international study found that 63% of women in science, engineering, and technology had experienced sexual harassment at work. The irony is that those who experience the most barriers to advancement, such as working mothers, are best able to identify structural impediments in the workplace. Unfortunately, they are least likely to be called upon for advice.

• Provide skills to identify and challenge discriminatory forms of masculinity for both men and women.
• Evaluate the effectiveness of interventions.
• Conduct needs assessments at all levels of the organization and analyze results by job-status.
These insidious cultural norms undermine egalitarian workplace policies. However, they are not only disadvantageous for women. As men participate in the exclusion of women, they also reinforce masculine notions of the ‘ideal worker’ that conflate dedication with workaholism at the expense of well-being and productivity. A recent study of corporate firms found that men, more often than women, highlighted balancing work and family as a key stressor, even though high-ranking women were 85% more likely than their male counterparts to have a partner who worked full time, and thus to face additional pressure in balancing work and family. Therefore, despite a high probability of spousal support and the fact that women continue to do the majority of domestic work, men still feel the strain of extreme work environments. This strain is compounded by the fear of taking advantage of flex-time or leave. Although this is unfortunate, men’s discomfort in the workplace provides a key opportunity for their engagement. The fact that men dominate the upper echelons of STEM studies and firms puts them in strategic positions to challenge harmful workplace practices.

What men and women’s experiences in the workplace culture tell us is three-fold.

1. Gender inequality, while advantaging men in terms of status and wealth, perpetuates toxic work environments that are bad for everyone.
2. Organizational policies must engage workplace culture if they are to be effective.
3. Men are key allies in changing how workplaces value and treat employees.

PART 5: ORGANIZATIONS: GENDERED LOGIC, GENDERED OUTCOMES

Although they may appear neutral, organizations make assumptions about workers that typically defer to a masculine norm. The timing of careers and promotions, the relationship to reproduction and the family, and the expectations of workers’ behaviors, all inform workplace policies. These policies are then universally applied, but unequally experienced. The expectation that someone else will tend to home and family has reproduced gendered divisions of labor between working men and stay at home women. Even though the majority of women work, women’s lower average earnings compared to men’s make it rational (if unfair) for a woman within a heterosexual couple to take on more of the unpaid parenting roles required by the family. Increasingly, however, men want to spend time with their children. Yet in the extreme work environments of STEM fields, fathers must negotiate their conflicting roles. Marianne Cooper documents how men in Silicon Valley’s STEM fields adopt a brand of masculinity that tries to balance work and family but saves face by remaining silent about this conflict. Instead, these men become the “genius warriors” their workplaces demand without protesting the incommensurability of extreme work arrangements with family life. Cooper’s study is the perfect demonstration of how socialization, workplace cultures, and organizational structures interlock to produce gendered outcomes. The expectation that men will never be “bogged down” by families when it comes to work is institutionalized and experienced by men as a form of manhood. At the same time, that very notion of manhood dictates that men should remain silent about work family conflict. As a result, work-family balance appears to remain a “women’s issue.”

Men may have slightly more latitude to remain silent than women who typically earn less, are taken less seriously, have less job security, and are less likely to have an at-home spouse. Nevertheless, research shows that, when suitable options are available, both men and women choose more egalitarian arrangements. Women are more responsive to egalitarian policies, an outcome of the greater pressure on them to tend to family matters, yet these findings show that change is both possible and desired. Men are key partners in this process. Challenging men’s silence over work-family conflicts by helping men to understand how their workplaces are not only unjust to women, but also harmful to men, will loosen the straightjacket of gender that keeps inequalities in place.

- Burnout and work-family conflicts are not just women’s (or men’s) issues, they are also work issues. Implement policies to reduce allowable work hours, extend deadlines, and reduce rewards for extreme work.
CONCLUSION: TAKING STOCK AND MOVING FORWARD

This research summary tracks gender inequality in STEM studies and workplaces, with a focus on early experiences and masculine cultures that not only exclude, discourage, and limit women, but also encourage unhealthy working environments for everyone, men included. Throughout childhood and grade school, girls are repeatedly discouraged, underprepared, and rendered invisible in STEM studies, often leading them to believe that they don’t have the skills or interests to persist in these fields. On the contrary, boys learn from a young age that STEM studies are fun and “for them.” These lessons are reinforced in classrooms and at home. Colleges continue this trajectory, introducing challenges to women in terms of teaching and learning styles, assessments, and treatment by their male peers. Men respond better to these structures, reinforcing their sense that they are better at STEM, and reducing their interactions with female colleagues and role models. The workplace tells a similar story. Men are advantaged even when they have the same qualifications, but they suffer disadvantages too. Extreme work environments promote norms of masculinity that silence men to speak up against impossible work-family trade-offs. Thus, these conflicts continue to be framed as “women’s issues.” However, this review demonstrates how men are important partners in the process of change. A variety of recommendations have been made to improve meaningful opportunities for girls, challenge norms of masculinities that inflate the number of men in STEM, and promote gender equality in this crucial field. They also suggest evaluations and research projects to ensure that this process is evidence-based. Increasing gender equality in STEM studies benefits men and women not just within STEM but in 90% of jobs in the future. The benefits are everyone’s. The time is now.

REFERENCES


Note that Harvey Mudd has recently introduced strategies to increase enrolment and retention of women in STEM. See: American Association of University Women. n.d. “Solving the Equation: The Variables for Women’s Success in Engineering and Computing.” http://www.aauw.org/research/solving-the-equation/.


