

Why Measure/Assess Your Organization?

Women are consistently underrepresented in engineering workplaces, especially in senior management positions, and face a high attrition rate.^{1,2} To address this, organizations must become aware of the impact human resources policies and practices have on diversity in the workforce.

Our study engaged 39 Canadian companies that employ engineers and focused on their human resources policies and practices. We examined the connection between the practices and percentages of women at different levels of the organization, pay, and tenure relative to men.

Changing Policies & Planning for the Future

In our study, women were paid less and had shorter average tenure than men, at all career levels. Only 18.4% of engineers at the non-managerial level were women in the 39 organizations. This percentage dropped considerably at managerial and senior leadership levels.

Organizations that sought women for leadership positions, and provided them with training and mentorship, had more women leaders. Women stayed longer at workplaces that offered paid maternity and paternal leaves, and a culture that supported gender diversity.

Measuring the recruitment, advancement and retention of women in an organization demonstrates a commitment to diversity, and provides concrete evidence about an organization's current situation. This paper presents a selection of policies and practices; implement those that make sense for your context and workforce.

Gender-inclusive policies benefit both men and women. Strengthening diversity requires implementing, communicating, and supporting policies and practices at the senior management level. Many women experience non-linear career paths⁹, and look for organizations that can accommodate their needs. This study demonstrates the benefits of woman-to-woman mentorship, training, maternity/parental leaves, and fair promotion practices.

Metrics & Benchmarks

Assess representation in your organization

E.g.: % of women in the following levels:

- Non-managerial
- Management
- Senior Management
- Board Members

Benchmarks include:

- % of recent graduates³
- % newly licenced engineers⁴
- % all licenced engineers⁴
- % board & CEOs⁵



Levels of responsibility are defined by provincial regulatory bodies e.g. APEGGA, PEO, APEGBC.⁶

e.g. APEGBC publishes a responsibility evaluation online,⁶ as well as a compensation survey that compares salaries by gender at different responsibility levels⁷.

Review compensation by gender & responsibility level

Review women's tenure at your organization

In this study, **tenure** positively correlated with:

Supportive climate for gender diversity*

Work-life balance policies

Salary of ♀ engineers at non-managerial level

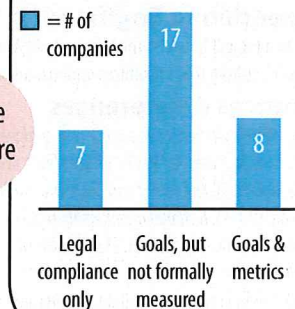
On-site child care

Paid parental leave*

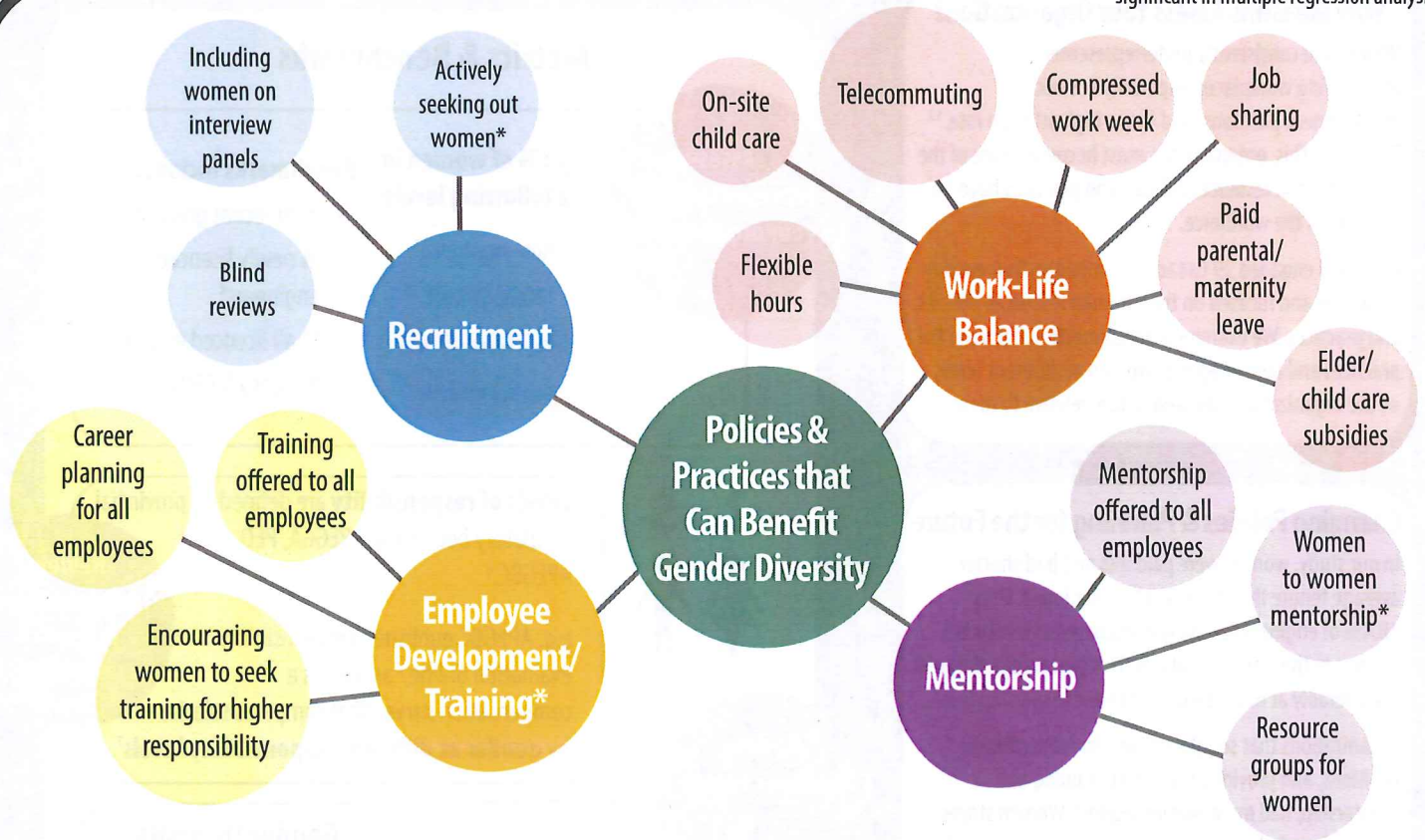
* significant in multiple regression analysis

Gender Diversity Performance

The HR practices of >60% of organizations in this study were in legal compliance⁸, but they did not use **formal metrics** to assess outcomes by gender.



* significant in multiple regression analysis



Learn more at WinSETT's workshop:
"Towards a Respectful and Inclusive Workplace"¹⁰

A place for senior leaders, managers, and team leaders to learn about the factors influencing the success of women in their organizations.

In our study, the most common practices were **training, career advancement** and **mentorship**.

The most common work-life balance policies were related to **flexible work** (telecommuting, flexible hours, compressed work week), and **maternity/ parental leave**.

About Engendering Engineering Success (EES)

EES is a joint research project between the University of Alberta, the University of British Columbia, and the University of Guelph. We aim to identify which organizational practices best predict an inclusive and supportive workplace culture that maximizes organizational commitment and productivity for both men and women.

More Resources & References

1. Hunt, J. (2010). *Why do women leave science and engineering?* (NBER Working paper 15853). Cambridge, MA: National Bureau of Economic Research.
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Stereotype Threat

refers to the concern with being viewed through the lens of a stereotype.¹

Stereotype threat is caused by cues in the situation that remind people of negative stereotypes.^{13,18}

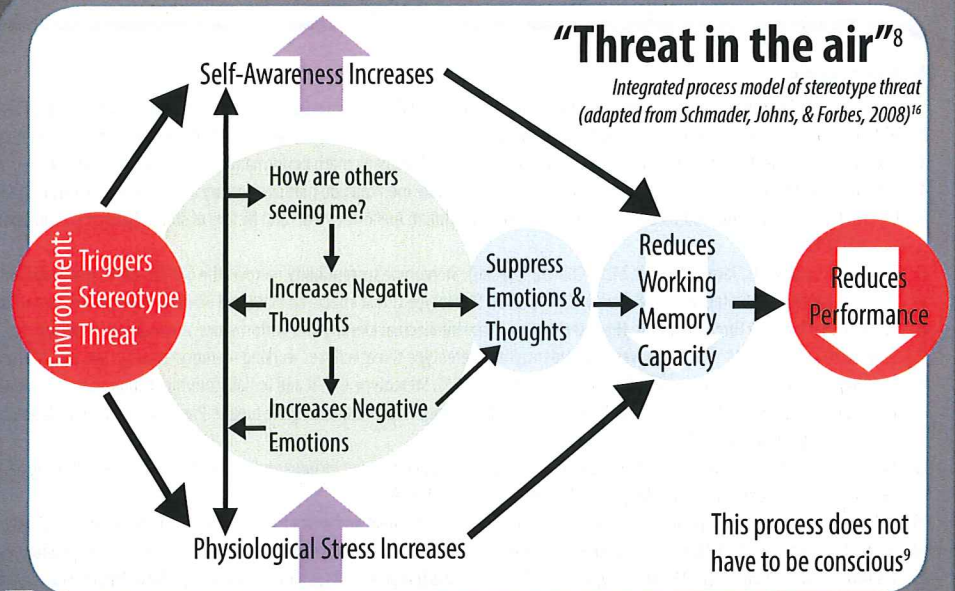
Anxiety over confirming these stereotypes can **impair** an individual's ability to perform up to their full potential.²

Research has shown that stereotype threat negatively impacts: women's math performance³ (compared to men's), White men's math performance⁴ (compared to Asian men), men's social sensitivity⁵ and spatial abilities⁶ (compared to women's), White athletic performance⁷ (compared to Black), and Black students' verbal problem-solving abilities¹ (compared to White students').

Stereotype threat may be a significant factor in undermining women's success and persistence in engineering.¹³ This has important implications for STEM fields. A simple reminder of one's race or gender is enough to elicit stereotype threat.¹⁸

STEM fields should consider ways to create identity safe environments to help people overcome stereotype threat.

By actively **raising awareness** about stereotype threat, providing **role models**, and **encouraging self-affirmation** exercises, individuals' performances are more likely to match their potential.

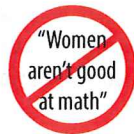


Environment Triggers

Don't...
... define people by their gender,



... or their group,



... or stereotype on performance expectations

Impact on STEM

Reduced:
Performance¹⁸
of women & minority students on the SAT, by 50 points¹⁸



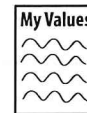
Job Engagement & Organizational Commitment
in academia¹¹ & in the engineering industry¹²

Coping Strategies & Alleviating the Threat



Role Models
Show that others have struggled and succeeded^{9,17,20}

Self-Affirmation
Write about your core values²¹

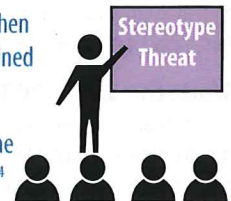


Reframing the Situation
Create identity safe contexts e.g. gender-fair tests³

Learning about Stereotype Threat

Performance improves when stereotype threat is explained before a test^{14,15,19}

Attribute the anxiety to the stereotype, not the self¹⁴



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About WWEST 2015-2020

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Unconscious bias refers to the assumptions and conclusions we jump to without thinking.¹

An example might be assuming that an older person walking with a child is their grandparent. These biases do not indicate hostility towards certain groups; they reflect how the individual has been socialized.

Several studies demonstrate the impact unconscious bias can have on the hiring process, particularly for women.



**Try the Implicit
Bias test:**
<https://implicit.harvard.edu/>

These biases may not be intentional, but their impact is severe. The effects of unconscious bias will not be overcome by maintaining our current efforts to recruit and retain more women.²



To reduce unconscious bias in hiring, committees and individuals need to be educated about its existence and effects in academia and industry.

Online tools such as the Harvard Implicit Association Test can help identify an individual's unconscious biases. Sharing research and becoming aware of your organisation's hiring tendencies can also help reduce unconscious discrimination.

To be seen as equally "**competent**" by reviewers, female researchers need to publish:

3 more
articles in
*Nature or
Science*

OR

20 more
articles in
specialist
journals

than male applicants when applying for a medical fellowship.⁵

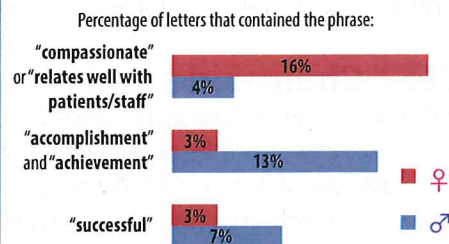
"We would have to see her job talk"



"I would need to see evidence that she had gotten these grants and publications on her own"

Psychology professors reviewing identical CVs were **4x** more likely to write **cautionary comments** for female applicants.⁴

Reference letters for female medical faculty were **shorter**, more **vague**, and placed **less emphasis on research** than those for males.⁶



The average letter length for women was **227** words, compared to **253** words for men.⁶

US science professors were asked to evaluate a CV for a **lab manager**.²



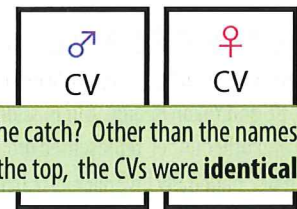
The male candidate was offered a **higher salary**...



... more **mentorship**



... and was rated more "**competent**" and "**hireable**."



The catch? Other than the names at the top, the CVs were **identical**.²



Women are **50%** more likely to advance in an orchestra audition if they **can't be seen**.³

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- More resources can be found at: <http://wiseli.engr.wisc.edu/>

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Social identity threat is an anxiety or concern people experience in situations where their social group is underrepresented, devalued, or stereotyped to be inferior.^{1,2}

This can be subtly triggered through conversations, or other interactions with peers and colleagues.

Social identity threat can be experienced when taking a challenging academic test, and results in poor performance on the test (known as stereotype threat^{3,4}).

Why Does This Matter for STEM Professions?

STEM fields have low representation, and a high attrition rate of women.⁶ For example, 11.7% of licensed engineers in Canada are women,⁷ and women are leaving the profession at a higher rate than men.⁸

STEM fields, particularly engineering, often involve a lot of collaboration between coworkers. Research has shown that for female engineers, work conversations with male colleagues can be a source of social identity threat and can lead to psychological burnout.¹

Actively addressing subtle behaviours that trigger social identity threat are critical steps in creating inclusive and safe workplaces, and retaining more women in STEM fields. This can be done through raising awareness about social identity threat, and creating spaces that welcome all identities.

Gender inclusive policies can result in all employees feeling more accepted and competent in daily conversations, and more engaged in their work.

Can Conversations Cue Social Identity Threat?



When we share ideas with others, we are **vulnerable** to a variety of responses.



Negative responses (critiques, dismissals) can trigger feelings of **incompetence** and **lack of belonging**.

When you belong to an unrepresented group, either of these feelings can cause social identity threat.

Psychological Burnout

affects individuals & organizations.

Often involves personal:⁵

- **Exhaustion**
- **Disengagement**
- **Inefficacy**

Negatively impacts **mental health**⁵



Reduces **organizational productivity**⁵

Predicts **employee turnover**⁵

The Workplace Study¹



Pairs of engineers who work together documented **daily conversations** at work.

Findings



On days when a conversation with a male colleague cued feelings of incompetence and a lack of acceptance...

For men:
no change in social identity threat levels



For women:
higher levels of social identity threat

Women reported experiencing **more daily social identity threat** than their male colleagues, predicting:

mental exhaustion

&

psychological burnout.

All employees feel more accepted and competent in daily conversations in workplaces with **gender inclusive policies**.



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Explicit & Implicit Stereotypes

Explicit stereotypes or attitudes are opinions that people consciously think about and assess. These can be shared verbally.

Implicit stereotypes¹ are automatic and involuntary associations that people make between a **social group** (i.e. "men") and a **domain or attribute** (i.e. "science" or "math").

A person can have different implicit and explicit stereotypes. For example, one can have conscious beliefs that men and women are equally capable engineers, yet may automatically associate engineering more with men than women. The implicit association of men with math or science is different than sexism, or explicit stereotypes about women's abilities, as implicit associations are unconscious and automatic.

In Summary

Working female engineers feel less committed to their job and less valued by their organization compared to their male counterparts.

Our results suggest that these gender differences could be tied to prevalent implicit gender stereotypes - associating engineering more with men than women - that working engineers tend to show regardless of their gender. A similar pattern could also exist between feeling valued by one's organization and implicit stereotypes.

Since these findings are correlational, it is difficult to infer causation. Future research needs to explore how exactly implicit gender stereotypes might impact working female engineers.

Employment Experiences Study

Women are underrepresented among working engineers². In this study, we explored how the experience of working as an engineer differs for men and women. We studied professional engineers (263 in total: 145 women, 118 men) who work in engineering companies across North America. All participants were trained and employed as engineers.

Implicit Gender Stereotypes & Engineering

Our findings:

On average, people of all genders **associated engineering** more with **men** than women.



When implicit stereotypes are **strong**, women are less committed to their job than men.

When implicit stereotypes are weak, men and women are equally committed to their job.

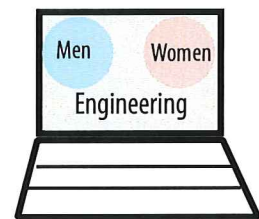


This study asks how widespread ideas about **gender and engineering** relate to women being more likely than men to drop out of engineering^{5,6,7}.

How Implicit Stereotypes Are Measured

The Brief Implicit Attitude Test⁴ (bIAT) measures implicit stereotypes and biases.

Words flash on a computer screen. Participants quickly decide whether or not each word fits into one of two categories presented on the screen.



When people have a strong implicit bias, they are faster to categorize science and math words along with words related to men but not women.

When people have no implicit bias, it's just as easy for them to categorize science and math words with "women" or "men."

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EES is a joint research project between the University of Alberta, the University of British Columbia, and the University of Guelph. We aim to identify which organizational practices best predict an inclusive and supportive workplace culture that maximizes organizational commitment and productivity for both men and women.

In a blind resume study, male candidates were offered higher salaries, more mentorship, and were rated as more **“competent”** and **“hireable,”** than women, despite the candidates’ resumes being identical.¹⁷

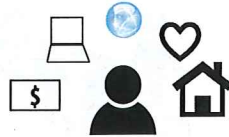
Several issues need to be addressed to **retain a diverse workforce**. The **“old white boys’ club”**³ that excludes others from informal networking, a lack of managerial awareness about diversity issues, poor work-life balance, and discriminatory behaviours against minority employees can dissuade all workers from being loyal to an employer in the long term.^{3,19}

Promoting diversity is not limited to gender; workplaces should be inclusive and welcoming to all.

The benefits of creating an inclusive workplace include low turnover, higher employee engagement, improved client relationships and satisfaction, stronger fiscal performance, and improved governance.^{4,5,6}

This paper highlights eight ways to recruit, support and retain a diverse workforce in organisations.

See work-life balance as an **investment** in your employees⁴



Offer **family-friendly** policies¹⁰



What policies does your organisation have?

Create and maintain clear policies on **promotions, retention, and work/life balance,** and **communicate** them to all employees



Flexible scheduling is vital for retaining **mid-career women**¹ and valuable to **all employees**¹⁵

Clear, well-documented, and equitable promotion and retention policies reduce **significant gender gaps**⁸



Which ones are priorities for your organisation?



Better management performance^{22,23}

Share priorities with staff, stakeholders & investors



Access to a **broader talent base**²⁶

Understand and communicate the business case for diversity

in your organisation



Increased **innovation capacity**^{24,25}

Stronger **financial performance**^{20,21,22}



16% higher Return on Sales²⁰

Fortune 500 companies with more women on average perform better²⁰

26% higher Return on Invested Capital²⁰

Negative interpersonal experiences at work predicted **lower organizational commitment** and **life satisfaction** for women⁹

Anxiety Isolation
Poor self-efficacy Stress
Self-conscious



Men in exclusive and stressful workplaces, report having poor physical health, including heart conditions⁹

Monitor the working climate and foster a positive, inclusive work culture

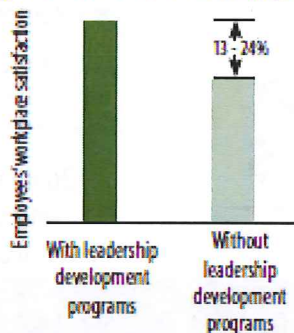
Have a zero tolerance policy for derogatory comments or actions³



Safe Space

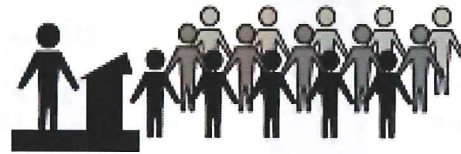
Provide **professional development opportunities** for all employees, on company time

LGBT employees are happier at organisations with **leadership programs**³



These programs also have positive effects for all employees, including more ownership, engagement, and co-operation²

Organisations tend to be self-replicating when hiring



Identify and invite or sponsor women for **leadership positions**^{6,15}



Male mid-level employees are more likely than women peers to apply for a managerial role despite **only partially** meeting the job description¹³

Become aware of your organisation's hiring tendencies and your subconscious biases



Subconscious biases⁷ affect **everyday decision-making processes** (hiring processes, assumptions made about others)



Set an example for embracing inclusivity in the workplace⁸

Non-traditional mentoring includes:¹¹

Speed Mentoring



Virtual Mentoring



Promote and establish **Mentoring Programs**[‡]

Provides Access to:^{5, 8, 12}

Knowledge

Support

Diverse Mentors

Networking



Understanding Workplace Diversity for Managers

Establish structured diversity measures⁷

- ☑ Include diversity as part of all employee's reporting;
- ☑ Track diversity (ethically);¹⁰
- ☑ Reflect your commitment in marketing and communications;
- ☑ Report on progress

Set targets⁵



Do a **Diversity Audit** at your organisation¹⁰

Ensure every employee has an opportunity for advancement³

Assign **accountability for diversity and track your progress¹⁰**

Create a culture of diversity¹⁰

Build **Diversity Culture** with diversity shares at meetings



Think **safe**.

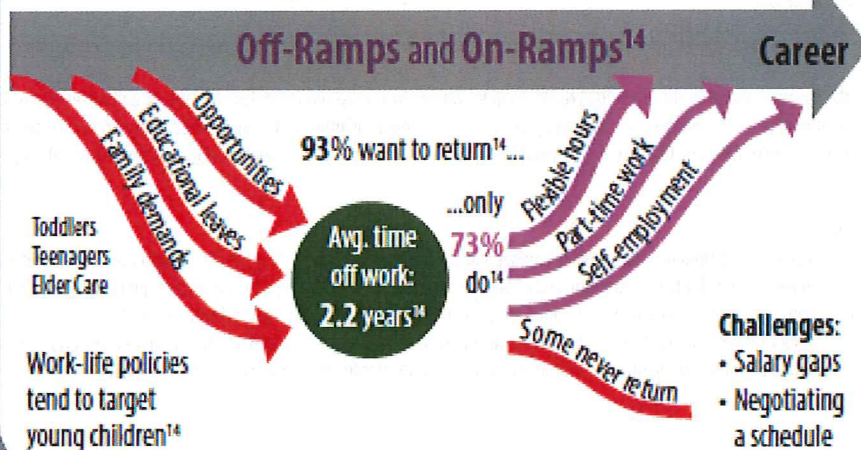
Safety comes from a **safety culture**;
Diversity comes from a **diversity culture**



Think **diverse**.

Why do women leave work?

60% of highly qualified women have **nonlinear** careers¹⁴
Historically, **24%** of highly qualified men also have nonlinear careers¹⁴
75% of the Millennial generation expect to have 2-5 employers in their life¹⁸



The Benefits of Change

Employees are more satisfied and committed when they have **positive work relationships** with managers and colleagues.³ By supporting diversity, managers and organisations can foster positive work cultures for all.

Committing to change can make a difference; UBC's Faculty of Science went from having **no women** in senior leadership positions from 2003-2007 to having **5/13** senior faculty positions held by women from 2007-2010.¹²

Managers should **celebrate their successes** and be open to a wide range of communication styles.¹ While the inequality gap tends to increase over time,⁸ taking direct action such as assigning accountability for diversity can lead to short and long term changes.

Training and feedback can be an effective method for eliminating managerial bias and inequality.⁷ Opportunities for technical and leadership development need to be available to **employees of all ranks**.¹

Allowing workers to off-ramp partially or completely and welcoming them back later **without penalty**, combating stigma and stereotypes by training staff to be self-reflective and deconstruct their own processes, and making organizational decision-making as transparent as possible helps build a **culture of diversity** within organisations.^{10,14} WWEST is currently researching which specific policies best support gender diversity in the workplace.⁴

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5. For more information, please see Engendering Engineering Success: <http://wwest.mech.ubc.ca/ees/>

About WWEST 2015-2020

Westcoast Women in Engineering, Science and Technology (WWEST) is the operating name for the 2015-2020 NSERC Chair for Women in Science and Technology (CWSE), BC and Yukon Region. Our mission is to promote science and to engage students, industry, and the community to increase the awareness and participation of women and other under-represented groups in science, technology, engineering, and mathematics (STEM). WWEST works locally and, in conjunction with the other CWSE Chairs, nationally on policy, research, advocacy, facilitation, and pilot programs that support women in science and engineering.

About the 2015-2020 WWEST Chairholder

Dr. Lesley Shannon P.Eng is an Associate Professor and Chair for the Computer Engineering Option in the School of Engineering Science at Simon Fraser University. Dr. Shannon studies computer systems design. She works in a rapidly growing field that combines custom computing hardware and software to design and implement application-specific computer systems for applications in a wide range of areas including robotics, machine learning, aerospace and biomedical systems, multimedia applications, and cloud computing. She teaches both undergraduate and graduate students in the area of Computer Engineering; she received the 2014 APEGBC Teaching Award of Excellence in recognition of her classroom and out-of-class mentoring activities and her contributions in leading a redesign of the School's undergraduate curriculum at SFU. Dr. Shannon has long been an advocate of increasing the diversity of students and workers in science- and engineering-related fields and was instrumental in developing programs to support a successful transition from high school into university.

Gendered Language & Stereotype Awareness for Hiring Committees

In a hiring process, stereotypes, unconscious bias and communication styles can **unknowingly influence** impressions of candidates and jobs.

Women's behaviour tends to be stereotyped as **communal** (kind, thoughtful, sensitive to others' feelings, deferent), whereas men are stereotyped as **agentic** (competitive, decisive, aggressive, socially dominant).¹ Women also are encouraged to be more self-assertive, but discouraged from advancing their interests at the cost of others.¹

Language can also be characterized as **feminine** or **masculine**; being more indirect, elaborate and emotional for the former, or more succinct, direct and instrumental for the latter.²

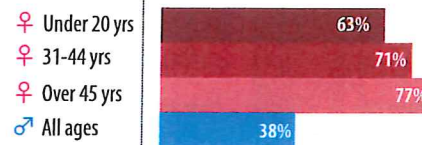
These stereotypes and assumptions can impact a hiring committee's assessment of a **candidate's abilities**, as well as the candidate's assessment of a job description and **their "fit"** within an organisation.

Job ads with masculine language are **less appealing** to women, regardless of job type, and decreased their **anticipated belonging** to the organisation.³ Conversely, gendered language had **no impact** on men's anticipated belonging.³

Gender Discrimination Exists

Gender segregation is the tendency for women to work in **systematically different occupations** and industries than men.⁴ This often occurs at **critical career points**, which can dissuade women from continuing in male-dominated industries.³

Women grow more aware of the **"glass ceiling"** as they advance in their careers:



Percentage of workers who believe barriers that prevent women from reaching management level exist⁶



Women with children experienced **declines in earnings and hours worked**; men with children correlated with **increased earnings and virtually unchanged hours**.⁵



Stereotypes & Their Effects

Stereotype: Men

Agentic:

competitive
decisive
aggressive
socially dominant



Stereotype: Women

Communal:

kind
thoughtful
sensitive to others
deferent



Traditionally, companies have valued agentic behaviour over communal behaviour



Agentic women are stereotyped as **competent**, but **interpersonally insensitive**.⁷

This is used to **justify** keeping them out of **male-dominated** management positions.^{1,3}

Some women counteract negative stereotypes by adopting a more masculine communication style.² This can be effective for some women, but not all. Agentic behaviours have social costs.²

Word Choice Matters

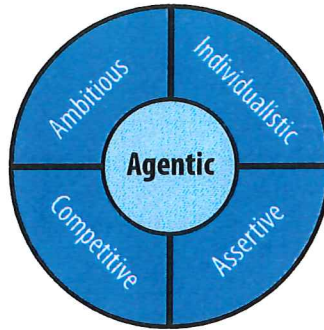
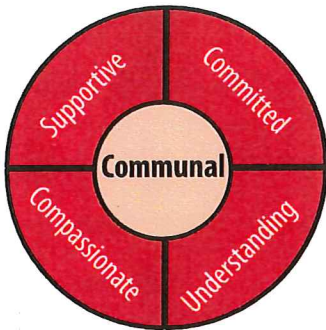
Gendered wording **subtly** signals who **belongs** and **who doesn't**.
Below are examples of language in job advertisements and qualities of candidates.

Feminine

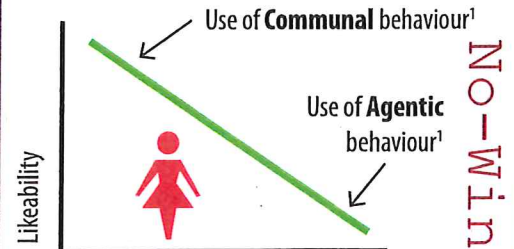
- a company's "**excellence**" in the market³
- "**understand** markets to **establish** appropriate selling prices"³
- "We are **committed** to providing top quality health care that is **sympathetic** to the needs of our patients"³

MASCULINE

- a company's "**dominance**" in the market³
- "**analyze** markets to **determine** appropriate selling prices"³
- "We are **determined** to deliver **superior** medical treatment tailored to each individual patient"³



Women in Leadership Positions



Both actions carry a **risk of being disqualified** from a job application.¹

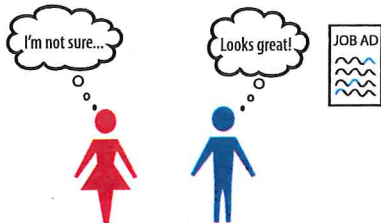
Observed Effects of Women Using Forced Agentic Behaviour

- ↑ Increase ♀'s **competence scores** to equally agentic men¹
- ↓ Seem more **threatening**; less **persuasive** & less **influential**²
- ↓ Decrease **compliance** of workers for ♀ managers²

If women need to manage the impressions they give off, it can lead to **stress, anxiety and reduced task performance**.^{2,3}

Gendered Job Descriptions³

For an Engineer



Gendered language has **no impact** on men's decision to apply, but may dissuade women.³



It also goes **unnoticed** in job advertisements; even when explicitly pointed out.³

<i>Feminine</i>	MASCULINE
" Proficient oral and written communication skills" ³	" Strong communication and influencing skills" ³
"Collaborates well, in a team environment" ³	"Ability to perform individually in a competitive environment" ³
" Sensitive to the clients' needs, can develop warm client relationships" ³	" Superior ability to satisfy customers and manage company's association with them" ³
"Provide general support to project teams in a manner complimentary to the company" ³	" Direct project groups to manage project progress and ensure accurate task control " ³

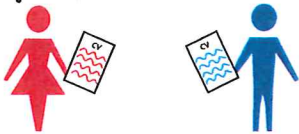
Gendered Language & Stereotype Awareness for Hiring Committees

"Qualified"

Only partially meet the advertised job requirements?

Men are more likely to apply, regardless.⁶

?



85% of women would only apply to a job if they met the job description "fully" or "pretty well."⁶

Women are also less likely to apply for masculine-stereotyped jobs.⁴

Deciding to Apply

3 main factors when individuals decide to apply:⁴



Men and women evaluate job decision factors differently because of **gender role socialization**.⁴

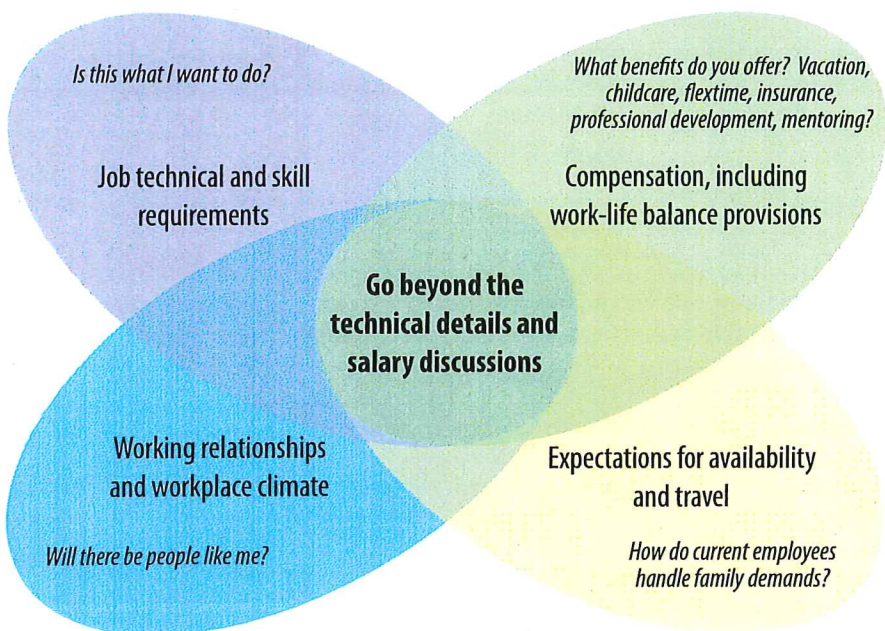
What Can We Do?

Gendered language is not a deliberate process - most job ads only contain 1% gendered language³ - but impact women's application decisions. Increasing **feminine language** in job descriptions can **increase women's interest** in the job.⁷

Organisations need to rethink their hiring process, and should ensure career advancement **reflects skills and capabilities** instead of emphasising time served.⁶ When attracting women to a job, **flexible working hours** and **work-life balance** are important,⁴ as well as ensuring they have a **sense of anticipated belonging** in the organisation.³ In the study of MBA graduates, women were no less likely to receive offers in masculine jobs; the segregation occurred in the application process where **women self-selected the jobs** they believed they fit.⁴

Women's leadership potential should be maximized through **professional development, mentoring, and proactively identifying** talented individuals and encouraging them to apply for upper level jobs.⁶ The negative effects of communal communication stereotypes can also be eliminated through **self-affirmation exercises**.²

Interview Best Practices⁴



Interview best practices help you find the best employee, and are **universally helpful, regardless of gender**.^{10,12} Lifestyle and workplace climate discussions are particularly important to women⁹ and young workers^{8,11} (Millennials / Gen Y).



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BC and Yukon Region

WWEST

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Westcoast Women in Engineering,
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About WWEST

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About the Chairholder

The Chair is held by Dr. Elizabeth Croft, P.Eng., FEC, FASME. Dr. Croft is the Associate Dean, Education and Professional Development in the Faculty of Applied Science, and a Professor of Mechanical Engineering at the University of British Columbia. She is also the Director of the Collaborative Advanced Robotics and Intelligent Systems (CARIS) Laboratory. Her research investigates how robotic systems can behave, and be perceived to behave, in a safe, predictable, and helpful manner. She is the lead investigator of "Engendering Engineering Success," a 3-year interdisciplinary research project that aims to take an evidence-based approach to increasing the retention of women in engineering by understanding and changing aspects of workplace culture that place women at a disadvantage.

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