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Recognising and Reducing Gender-based Violence in the Professional Engineering Workplace

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ABSTRACT

CONTEXT

Despite ongoing attempts to increase the number of women in engineering, they remain underrepresented in the engineering workplace. In addition to the difficulty in attracting females to STEM subjects in high school and university, and hence STEM careers, there is significant attrition of women from the STEM workforce. While there are challenges around caring responsibilities and difficulty with flexible work arrangements, the bigger problem is the workplace culture, with a majority of women reporting discrimination, harassment and/or exclusionary behaviour in the workplace. Organisational responses such as policies, procedures and training programs are frequently not implemented well, or at all, leading many women to leave the workplace.

PURPOSE

This paper proposes that the problem is not organisational but a social. The key scientific contributions of this work include the use of a socio-ecological model for gender-based violence to categorise the experiences of women in engineering as documented in published literature. This demonstrates not only that engineering has a distinct problem with gender-based violence, but also that tools and frameworks used in the social sciences and humanities are applicable in engineering context, and can provide a new perspective, as well as support us to create and evaluate change.

APPROACH

A socio-ecological model was sought out and used as a framework for categorising the lived experiences of women in the engineering and STEM fields. These experiences are typical of those reported through literature based on interviews with female engineers, and those in surveys.

OUTCOMES

The successful application of the socio-ecological model of gender-based violence shows that the engineering profession has an entrenched problem with norms, practices and structures that foster gender inequality, with women in the engineering workplace experiencing expressions of gender-based violence that cause emotional and psychological harm. It also shows that tools from the social sciences and humanities can support the investigation of factors affecting women in the engineering workplace. Further, approaches and tools used to inform the development and evaluation of initiatives that respond to social issues such as gender-based violence in the wider community can be used to design and evaluate a response strategy for the engineering profession.

CONCLUSIONS

A curricular response in engineering education, based on the approaches used in the social sciences and humanities, has the power to equip graduate engineers with the skills and attitudes that will ensure that everyone is welcome in the engineering workplace of the future.

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KEYWORDS

Gender-Based Violence, Diversity and Inclusion, Women in Engineering

Note

This paper does not aim to be inflammatory or devalue the contributions being made in the workplace to date. Colleagues who actively promote diversity and support equity groups in the engineering workplace are making a difference. The aim of this work is to use an existing framework to better describe the circumstances faced by women in engineering to better define the problem. The authors hope that this paper facilitates discussion around the topic by making it more visible, more tangible, and providing words and lenses to use in these discussions. Furthermore, the proposed framework lends itself to the investigation of experiences of other equity groups.

Introduction

The continuing underrepresentation of women in science, technology, engineering and mathematics (STEM) areas, and in particular engineering, has been the subject of many reviews, reports and recommendations. The statistics for engineering are relatively stagnant, with only 13% of professional engineers in the Australian workforce being female (Engineers Australia, 2022). Many recommendations focus on increasing the gender diversity of students who choose to study engineering at university in an effort to grow the pipeline. Given that only 16 % of Australian engineering graduates are female (Engineers Australia, 2022), there is clearly more to be done.

Much of the work focuses on what women can or are already doing to change the situation – women should support each other, can develop the persistence to succeed, and should help drive the change (Arthur, 2020; Engineers Australia's Women in Engineering National Committee, 2012; Hatmaker, 2013) but do note that this is a burden to be taken on by women alone (Hatmaker, 2013) and call for a more inclusive culture (Buzzanell et al., 2023; Dabić et al., 2024). Organisations publishing in this area unsurprisingly focus on corporate and systemic actions (Engineers Australia, 2022; Professionals Australia, 2021). Feminist researchers call for wholesale change in the gendered profession of engineering (Bastalich et al., 2007; Riley et al., 2009). Researchers agree that this is a complex and multifaceted problem.

In response to the many other complex, multifaceted problems facing the world, and the changing role of engineers working with these problems, the International Engineering Alliance (2021) have updated their graduate capabilities to increase the focus on diversity and inclusion. This is part of a larger body of work done to incorporate the United Nations Sustainable Development Goals (UN SDGs) into the IEA graduate attributes. Indeed, the underrepresentation of women in engineering directly relates to UN SDG 5, Gender Equality. Before engineering graduates can solve the problems facing the world, the engineering profession needs to address the systemic problems that exist within its own structure and workforce.

Many programs focus on growing the pipeline of girls into STEM studies and careers. This results in quantifiable goals and is easily measured, such as by the STEM Equity Monitor Data Report 2024 (Australian Government Department of Industry Science and Resources). The interest and participation in all areas of STEM in schools, higher education and workforce are evaluated, which supports the evaluation of measures towards gender parity in STEM. These are positive actions, though they can’t be the only solution. The 2022 report on Women in Engineering (Engineers Australia, 2022) notes that women do not typically leave engineering because of the work but because of the workplace. Bullying, harassment and exclusion characterise a non-inclusive workplace culture which is exhausting for the female engineers who are working in it. The materially different experience of women in STEM compared with male colleagues is due to the widely established prevalence of gender-based discrimination, sexual assault and sexual harassment (SASH) in these fields (Barnacle et al., 2023).

For every report about the problems facing women in engineering (and this paper quotes only a few of the many in existence) there are recommendations. Some are highly practical and

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procedural, others are more qualitative. Typically these include “Gender Bias Training” and Flexible Work Arrangements (Engineers Australia, 2022), and calls for a more diverse and inclusive environment (Buzzanell et al., 2023; Dabić et al., 2024). As university educators we are in a position where we can foster a more inclusive attitude in our students. The authors suggest that the best way to create the necessary change is by equipping graduate engineers with the skills and attitudes that will ensure that everyone is welcome in the engineering workplace of the future.

The updated IEA graduate attributes also include a reference to the “relevant social sciences” in terms of the knowledge of graduate engineers. This paper poses the research questions, “Does the social sciences and humanities (SSH) field offer tools or frameworks that can help us to identify factors that contribute to the lived experience of women in engineering? If so, do they have the potential to support us to create and evaluate positive change?”

Gender Stereotypes

Bias and stereotyping are noted as a persistent problem in STEM workplaces (Commonwealth of Australia, 2019). Much work has been done investigating gendered stereotypes and norms, with Stewart et al. (2021) completing a systematic review of interventions aimed to shift attitudes or behaviours towards gender stereotypes. All 71 studies included in the review aimed to change attitudes and beliefs surrounding gender norms and/or stereotypes in varying contexts. The implicit theory of change was that a greater knowledge of the situation would lead to more equitable attitudes and beliefs and therefore shifts in behavioural intentions. The most successful of these interventions predominantly used education as the key driver, with some also using community mobilization or research alongside education. To strengthen impact, additional strategies were used, with 17 studies also using an ecological framework to support the change at multiple levels.

A socio-ecological framework is a way of systemising the wider environment around an individual and capturing the relationships between the individual and the environmental factors. A systematic representation such as this can help support a systematic response. For example, programs can target change at an individual (per-person) level, as well as a community-level response.

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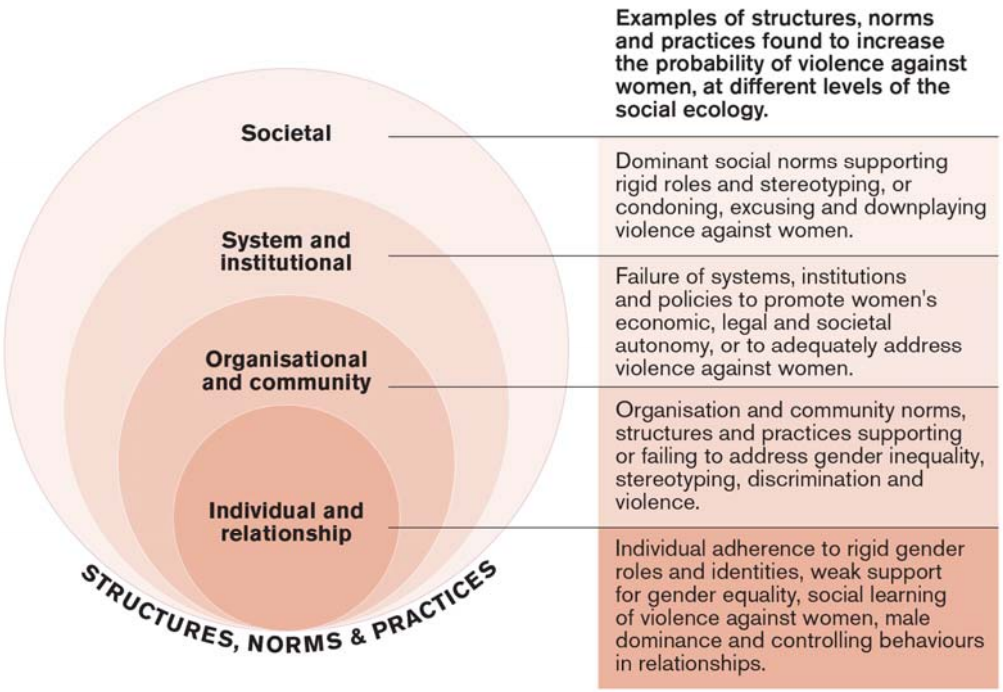

Figure 1: Socio-ecological model of structures, norms and practices that increase the probability of violence against women. (Our Watch, 2021a)

Gender stereotyping appears in the socio-ecological model of factors that increase the probability of violence against women (Our Watch, 2021a) which is shown in Figure 1. This is no coincidence, with two significant drivers of violence against women being *"the unequal distribution of power and resources between men and women [and] an adherence to rigidly defined gender roles and identities, i.e. what it means to be masculine or feminine"* (VicHealth, 2014).

What is Gender-based Violence?

Gender-based violence refers to men's violence against women comprising any act that results in, or is likely to result in, physical, sexual or psychological harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or in private life.

These forms of violence include physical, sexual, emotional, psychological, social, cultural, spiritual, financial and technology-facilitated violence or abuse (including image-based abuse), and stalking. This definition encompasses violence that occurs in many contexts, including in the home, in residential care and institutional settings, in workplaces, public places, and online or virtual spaces.(Our Watch, 2021b)

Gender-based violence (GBV) is much more than the domestic violence or sexual assault that might initially come to mind. Still, the idea that this has some relevance to the engineering workforce might not be obvious to many. Indeed, we might like to think that as a profession, the occurrence of overt sexually discriminatory behaviour and sexual harassment behaviours has reduced. The experience of female engineers and other STEM professionals suggests that there is still a pervasive problem, with many challenges persisting with workplace culture, exclusionary behaviours, biases in decision-making and recruitment, discrimination, sexual harassment and gender stereotyping (Professionals Australia, 2021). It is important to note that in this context

violence includes emotional and psychological harm, which is less obvious than overt physical manifestations of violence though still with the potential for significant long term effects (Beaton et al., 2015). Many small problems, easily minimised or ignored, combine to create an insidious problem for the women working in these environments. In the following section, the experiences of women in engineering and in STEM workplaces will be unpacked through the lens of the socio-ecological model from Our Watch (2021a, 2021b).

Gender inequality describes the unequal access to opportunities, resources and power due to ongoing structural and societal causes. Gender is not the only driver of inequality, and it is acknowledged that other groups, and intersections thereof, face inequalities as well. For simplicity this paper will concentrate on the circumstances and experiences of female engineers. It is widely acknowledged that steps taken to assist the inclusion of one minority group will assist others – by reducing inequalities experienced by female engineers, we can do the same for others.

Approach

Key terms from the socio-ecological model in Figure 1 were selected where they are transferrable to the professional engineering workplace. For example, “rigid roles and stereotyping”. The literature around women in engineering and STEM workplaces was then reviewed through the lens of the key terms, with examples found to support the link between the enablers of gender-based violence and the experience of women in the engineering workplace. The literature review was not exhaustive, requiring only an example of the key term being documented in the literature. The results of the survey undertaken by Professionals Australia (2021) was particularly useful, with 39.2% of the 957 responses being from engineers.

Table 1 draws out key phrases from Figure 1 and provides references to literature where this has been identified as a problem with respect to gender in the engineering workplace. Factors can be linked at every level – from consistent anecdotal experiences of individual women up to the societal view of the profession of engineering. Explicit physical violence has been omitted from the chart, as it is the most recognised and acknowledged form of GBV. This is not to understate its impact or the importance of addressing this serious problem. In this paper, we have chosen to focus on the more insidious contributors to GBV that may not be as well recognised.

Table 1: Linkage between contributors to GBV and women's experiences in the STEM workplace.

Level	Key Phrase	Examples from literature
Individual and relationship	Rigid gender roles	Requests to organise catering and perform nurturing roles, and being compartmentalised as wives and mothers. (Hatmaker, 2013) Being left out of technical tasks and allocated the 'softer', "documentation" tasks. (Professionals Australia, 2021)
	Weak support for equality	Women feeling it is easier to dress and act "as one of the boys" (Hatmaker, 2013) Men's feelings of elitism and exclusivity (Buzzanell et al., 2023) Women being held to a higher standard for recognition, flexible work, credibility. (Professionals Australia, 2021)
	Male Dominance	Pressure for women to behave in a feminine manner in a masculine environment, while men self-promote and seek to take charge. (Williams, 2016) Prevalence of the "Boy's Club" culture. (Professionals Australia, 2021)
Organisational and community	Norms supporting gender inequality	Introducing a woman as the "diversity hire". (Hatmaker, 2013) Most people imagine a brilliant engineer to be a man. (Williams, 2016) Repeatedly being ignored in meetings. (Professionals Australia, 2021) Lack of equal pay. (Australian Government Department of Industry Science and Resources, 2024; Professionals Australia, 2021)
	Norms supporting stereotyping	Doubting of women's technical abilities, with them needing to repeatedly prove themselves. (Williams, 2016) Challenges for women to upskill, with PD opportunities being offered to "more committed staff" and hiring and promotion activities favouring "white men" [like the selection panel]. (Professionals Australia, 2021)
	Norms supporting discrimination	Some male engineers openly express that they don't like to work with women engineers. (Hatmaker, 2013) Motherhood has a strong negative correlation with perceptions of competence and commitment (Williams, 2016)
System and institutional	Failure of systems	56.7% of female STEM professionals in Australia were discriminated against based on their gender. 22% left the workplace as a result. (Professionals Australia, 2021) Women are reluctant to report sexual assault or harassment due to implications for career. (Professionals Australia, 2021)
	Failure of policies	A gap often exists between an organisation's policies and the actual workplace culture. This is due in part to lack of strategy to implement. (Professionals Australia, 2021) Unconscious bias in promotion, recruitment and decision making. (Professionals Australia, 2021)
Societal	Dominant social norms supporting rigid roles	Engineering's occupational culture has been labelled masculine, manly, and male-centred. (Hatmaker, 2013) Australian culture doesn't currently support the participation of all in STEM – not just "white haired men in lab coats". (Commonwealth of Australia, 2019)
	Dominant social norms supporting rigid stereotyping	Engineering has been depicted as valuing masculine interaction styles such as aggressive displays of technical ability, self-promotion and self-confidence. (Hatmaker, 2013) Lack of female role models in STEM in the classroom, at work or on the screen. (Commonwealth of Australia, 2019)

As noted in the introduction, the 2022 report on Women in Engineering (Engineers Australia, 2022) notes that women do not typically leave engineering because of the work but because of the workplace. The contents of Table 1 show that the engineering profession has an entrenched problem with norms, practices and structures that foster gender inequality at all levels of the model. This results in psychological harm and suffering even when physical or sexual harm is not immediately apparent. It is important that we recognise these as expressions of gender-based violence and respond accordingly.

Based on Table 1, the socio-ecological model for factors predicting gender-based violence seems highly applicable and relevant to the context of women in STEM workplaces.

Given that a tool from the SSH fields has been found useful to describe the challenges facing women in the engineering and wider STEM fields, can interventions that have been used by SSH practitioners to address challenges such as GBV, and which use a socio-ecological model, also be applicable to the engineering field?

Responses to Gender-based Violence

With an improved understanding of the linkage between GBV and the experiences of women in the engineering workplace, the Action Plan Addressing Gender-based Violence in Higher Education (Education Ministers Meeting, 2023) is directly relevant to engineering educators. The action plan requires universities to adopt a whole-of-organisation approach to preventing and responding to gender-based violence. This is an outcome that has likely received little attention in the engineering departments across the country. However, the action plan presents an opportunity to make real change to the engineering profession by upskilling engineering students with a curricular response.

As noted earlier, many interventions use the ecological model to facilitate responses at more than one level of the system. As university educators, while we might strive to change the world, the biggest impact we can make is at the inner two layers – the individual level and the community and organisational level, equipping our students to be changemakers in their workplaces.

A Curricular Response

Respect is a consistent theme in the literature around establishing inclusive workplace cultures (Robotham & Cortina, 2021), higher education contexts (Barnacle et al., 2023) and reducing gender-based violence (Orr et al., 2022). The need to develop empathy and understanding (Our Watch, 2021b), as well as the importance of a longitudinal approach in place of one off sessions (Barnacle et al., 2023; Our Watch, 2021b; Universities Australia, 2023) are well documented.

Therefore, any curricular response should be longitudinal, and focus on the wider view of building connectedness, respect and empathy as well as knowledge of gender inequalities.

Teaching Empathy

It is perhaps unhelpful to focus too strongly on educating our students about the drivers of gender-based violence without first assisting them to develop their interpersonal and socio-emotional skills, in particular, empathy. After all, understanding the theory behind what causes gender-based violence is hardly a call to action to someone who doesn’t empathise with the experience of another person.

There is a growing body of work in the area of empathy in engineering, such as the work of Walther et al. (2017) who propose a model for teaching empathy as a core skill for engineers, though it is not explicitly linked to workplace challenges such as GBV and SASH. More recent work (De Zoysa et al., 2024) adds to the argument for teaching empathy to engineering students, focusing on prosocial forms of empathetic action, and the potential impact on professional performance, including leadership and teamwork, though again not directly on the reduction of GBV and the enabling factors prevalent in the engineering workplace.

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Skills such as empathy can be measured, and improved, with higher levels of emotional intelligence being linked to academic and career success. Jardim et al. (2022) developed a Soft Skill Inventory which they assert enables higher education students to self-assess skills they identified as being associated with academic and professional success: *self-determination, resilience, empathy, assertiveness, social support, and teamwork.* Facilitating students to identify an empathy deficit may assist them to prioritise increasing their empathy as part of their higher education if the personal benefits of increasing empathy are explained.

Different approaches to teaching empathy to medical students have been analysed, with didactic approaches (with or without other instructional approaches) being identified as the most effective approach (Ngo et al., 2022). The explanation for this is the explicit theoretical framework used for empathy training and the structure it provides the learner for assimilating the new concepts.

Barriers to Implementation

There are barriers to implementing changes in the engineering curriculum. The authors suggest that one such barrier is the similarity of the engineering education workplace with the wider engineering profession, and the lack of understanding and recognition of the problem in engineering faculties.

Other identified barriers to incorporating social science and humanities (SSH) content in the STEM curriculum include resistance to change, external influences on curricula, lack of guidelines, and misconceptions on what SSH in STEM involves (Josa & Aguado, 2021).

It is understandable that engineering academics, used to dealing with the highly practical, often tangible field of engineering, might find the idea of teaching seemingly abstract concepts such as empathy challenging, with the outcomes being difficult to quantify. However, as the educators of the engineers of the future, the onus is on engineering academics to identify any gaps in their personal and professional skill sets and undertake development accordingly.

A Path Forward

How then can engineering academics create a safe learning environment when SSH and the intentional development of skills such as empathy were unlikely included in their own learning journey?

Our Watch (2021b) provide numerous recommendations for academics to contribute to the prevention of gender-based violence through curriculum, including; *educating themselves on gendered-violence first, then honing their own intersectional lens for more self-awareness and self-reflection that can place student's learning needs at the centre of their work, applying a gender lens to teaching content and considering what bias is being brought and whose experience is not represented, modelling equity and using the power and authority that comes with their role to facilitate inclusion and empowerment of others, develop and tailor teaching resources to integrate new learning into curriculum, and create safe, respectful and open learning environments.*

Engineering educators can also look to disciplines that include a trauma-informed approach to teaching and learning. Goddard et al. (2022) provide a definition of trauma-informed education in nursing that could well be applied to STEM fields. It is described as *"collaborative, relation-based approach in which trauma awareness and resilience building create a learning environment safe for self-exploration, understanding, and problem solving."*

Evaluation

The social sciences also offer tools for evaluating initiatives. Evaluation of change in complex systems can be undertaken using tools such as program logic models. Schiavo et al. (2020) used a socio-ecological model, along with a program logic model, to undertake evaluation of an immunisation initiative in Kyrgyzstan. A similar approach could be utilised in this context.

Conclusion

The questions posed at the beginning of this paper were, “Does the social sciences and humanities (SSH) field offer tools or frameworks that can help us to identify factors that contribute to the lived experience of women in engineering? If so, do they have the potential to support us to create and evaluate positive change?” The answer to both questions has been shown to be yes. The novel contribution of this paper is to identify the applicability of the GBV socio-ecological model to the documented experiences of women in the engineering profession. This has been shown through the provision of typical examples of the drivers for gender-based violence which are prevalent in the profession.

The Action Plan Addressing Gender-based Violence in Higher Education (Education Ministers Meeting, 2023) provides an opportunity for engineering educators to propose a curricular response as part of the institutional responses of their universities. Characteristics of a curricular response, along with examples in other disciplines have been presented at a high level. The frameworks and tools used within the SSH disciplines, along with resources and approaches used to target gender-based violence, can support engineering academics to build empathy and break down the enablers of SASH. In this way we can all contribute to increasing gender equity and decreasing gendered violence in the engineering education and workplace contexts.

Further Work

This work has only touched the tip of the iceberg. An extensive review of SSH frameworks and tools is warranted, with relevant frameworks having potential to support the evaluation of the current curricular resources for teaching empathy, respect and building community in the engineering education context. Best practice for teaching the content linked to reducing gender-based violence can then be contextualised to the engineering education environment and an implementation framework established. SSH tools for evaluating change, such as program logic models, deserve further investigation for potential application to the context. oCollaboration with those in the SSH fields will be critical to the success of this project.

References

Arthur, B. (2020). 'No, I'm not the secretary': using participatory methods to explore women engineering students experiences on co-op. *International Journal of Work-Integrated Learning*, *v21 n3*, 211-222.

Australian Government Department of Industry Science and Resources. (2024). *STEM Equity Monitor Data Report 2024*. https://www.industry.gov.au/sites/default/files/2024-07/STEM-Equity-Monitor-data-summary-report-2024.pdf

Barnacle, R., Cuthbert, D., Hall, A., & Sidelil, L. T. (2023). Respect@Uni: A feminist insider perspective on respect-based culture change in higher education. *Critical Studies in Education*, *64*(4), 318-336. https://doi.org/10.1080/17508487.2022.2143837

Bastalich, W., Franzway, S., Gill, J., Mills, J., & Sharp, R. (2007). DISRUPTING MASCULINITIES. *Australian Feminist Studies*, *22*(54), 385-400. https://doi.org/10.1080/08164640701578765

Beaton, A. M., Tougas, F., Rinfret, N., & Monger, T. (2015). The psychological disengagement model among women in science, engineering, and technology. *British Journal of Social Psychology*, *54*(3), 465-482. https://doi.org/https://doi.org/10.1111/bjso.12092

Buzzanell, P. M., Arendt, C., Dohrman, R. L., Zoltowski, C. B., & Rajan, P. (2023). Engineering Emotion Sustainably: Affective Gendered Organizing of Engineering Identities and Third Space. *Sustainability*, *15*(6).

Commonwealth of Australia. (2019). *Advancing Women in STEM*. https://www.industry.gov.au/sites/default/files/March%202020/document/advancing-women-in-stem-strategy.pdf

Dabić, M., Posinković, T. O., Maley, J. F., Vlačić, B., Marzi, G., & Kraus, S. (2024). Exploring the Multifaceted Challenges of Women in Engineering: A Comprehensive Literature Review. *IEEE*

Transactions on Engineering Management, *71*, 3325-3339. https://doi.org/10.1109/TEM.2023.3342980

De Zoysa, R., Male, S., & Chapman, E. (2024). Motivation and the role of empathy in engineering work. *Australasian Journal of Engineering Education*, 1-11. https://doi.org/10.1080/22054952.2024.2346410

Education Ministers Meeting. (2023). *Action Plan Addressing Gender-based Violence in Higher Education*. https://www.education.gov.au/action-plan-addressing-genderbased-violence-higher-education/resources/action-plan-addressing-genderbased-violence-higher-education

Engineers Australia's Women in Engineering National Committee. (2012). *Women in Engineering - Industry Blueprint of Successful In-House Professional Women's Programs - Supplemental*. https://www.engineersaustralia.org.au/sites/default/files/resource-files/2017-01/wie_industry_blueprint_supplemental_final.pdf

Engineers Australia. (2022). *Women in Engineering June 2022*. https://www.engineersaustralia.org.au/sites/default/files/women-in-engineering-report-june-2022.pdf

Goddard, A., Witten Jones, R., Esposito, D., & Etcher, L. (2022). Trauma-Informed Education in Nursing: A Concept Analysis. *Journal of Nursing Education*, *61*(6), 296-302. https://doi.org/10.3928/01484834-20220404-15

Hatmaker, D. M. (2013). Engineering Identity: Gender and Professional Identity Negotiation among Women Engineers. *Gender, Work & Organization*, *20*(4), 382-396. https://doi.org/https://doi.org/10.1111/j.1468-0432.2012.00589.x

International Engineering Alliance. (2021). *Graduate Attributes & Professional Competencies*. https://www.internationalengineeringalliance.org/assets/Uploads/Documents/IEA-Graduate-Attributes-and-Professional-Competencies-2021.1-Sept-2021.pdf

Jardim, J., Pereira, A., Vagos, P., Direito, I., & Galinha, S. (2022). The Soft Skills Inventory: Developmental procedures and psychometric analysis. *Psychological Reports*, *125*(1), 620-648. https://doi.org/10.1177/0033294120979933

Josa, I., & Aguado, A. (2021). Social sciences and humanities in the education of civil engineers: Current status and proposal of guidelines. *Journal of Cleaner Production*, *311*, 127489. https://doi.org/https://doi.org/10.1016/j.jclepro.2021.127489

Ngo, H., Sokolovic, N., Coleman, A., & Jenkins, J. M. (2022). Teaching empathy to mental health practitioners and trainees: Pairwise and network meta-analyses. *J Consult Clin Psychol*, *90*(11), 851-860. https://doi.org/10.1037/ccp0000773

Orr, N., Chollet, A., Rizzo, A. J., Shaw, N., Farmer, C., Young, H., Rigby, E., Berry, V., Bonell, C., & Melendez-Torres, G. J. (2022). School-based interventions for preventing dating and relationship violence and gender-based violence: A systematic review and synthesis of theories of change. *Review of Education*, *10*(3), e3382. https://doi.org/https://doi.org/10.1002/rev3.3382

Our Watch. (2021a). *Change the story. A shared framework for the primary prevention of violence against women in Australia (second edition)*. https://assets.ourwatch.org.au/assets/Key-frameworks/Change-the-story-Our-Watch-AA.pdf

Our Watch. (2021b). *Educators' guide to upskilling pre-service professionals to support the prevention of gender-based violence: Advice for teaching academics about integrating prevention of gender-based violence concepts into teaching content and practice.* O. Watch. https://assets.ourwatch.org.au/assets/Unis-resources/Educators%E2%80%99-guide-to-upskilling-pre-service-professionals-accessible.pdf

Professionals Australia. (2021). *Women Staying in the STEM Workforce*. https://members.professionalsaustralia.org.au/documents/Gender/Women_in_STEM_survey_report_2021.pdf

Riley, D., Pawley, A. L., Tucker, J., & Catalano, G. D. (2009). Feminisms in Engineering Education: Transformative Possibilities. *NWSA Journal*, *21*(2), 21-40. http://www.jstor.org/stable/20628172

Robotham, K., & Cortina, L. (2021). Promoting respect as a solution to workplace harassment. *Equality, Diversity and Inclusion: An International Journal*, *40*(4), 410-429. https://doi.org/10.1108/EDI-04-2019-0137

Safe+Equal. (2020, 06/08/2020). *Rigid gender roles and stereotypes*. Retrieved 17/08/2024 from https://safeandequal.org.au/2020/08/06/rigid-gender-roles-stereotypes/

Schiavo, R., Basu Roy, U., Faroul, L., & Solodunova, G. (2020). Grounding evaluation design in the socio-ecological model of health: a logic framework for the assessment of a national routine immunization communication initiative in Kyrgyzstan. *Global Health Promotion*, *27*(4), 59-68. https://doi.org/10.1177/1757975920914550

Stewart, R., Wright, B., Smith, L., Roberts, S., & Russell, N. (2021). Gendered stereotypes and norms: A systematic review of interventions designed to shift attitudes and behaviour. *Heliyon*, *7*(4), e06660. https://doi.org/https://doi.org/10.1016/j.heliyon.2021.e06660

Universities Australia. (2023). *Primary Prevention of Sexual Harm in the University Sector | Good Practice Guide*. https://universitiesaustralia.edu.au/wp-content/uploads/2023/07/PRIMARY-PREVENTION-OF-SEXUAL-HARM-IN-THE-UNIVERSITY-SECTOR.pdf

VicHealth. (2014). *Australian's attitudes to violence against women*. Victorian Health Promotion Foundation. https://www.vichealth.vic.gov.au/sites/default/files/NCAS-Summary-Final.pdf

Walther, J., Miller, S., & Sochacka, N. (2017). A Model of Empathy in Engineering as a Core Skill, Practice Orientation, and Professional Way of Being: A Model of Empathy in Engineering. *Journal of Engineering Education*, *106*, 123-148. https://doi.org/10.1002/jee.20159

Williams, J. a. L., Su and Rincon, Roberta & Finn, Peter. (2016). Climate Control: Gender and Racial Bias in Engineering? *American Society for Engineering Education*.

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