

Gender as structure in the organisational socialisation of newcomer civil engineers

Kacey Beddoes

To cite this article: Kacey Beddoes (2022) Gender as structure in the organisational socialisation of newcomer civil engineers, European Journal of Engineering Education, 47:1, 102-116, DOI: [10.1080/03043797.2021.1915251](https://doi.org/10.1080/03043797.2021.1915251)

To link to this article: <https://doi.org/10.1080/03043797.2021.1915251>



Published online: 15 Apr 2021.



Submit your article to this journal [↗](#)



Article views: 161



View related articles [↗](#)



View Crossmark data [↗](#)



Citing articles: 1 View citing articles [↗](#)



Gender as structure in the organisational socialisation of newcomer civil engineers

Kacey Beddoes

San Jose State University, San Jose, CA, USA

ABSTRACT

While the importance of school-to-work transitions is increasingly recognised, little research has examined the roles that gender plays in those transitions. This is a problem because of the higher rates of attrition of newcomer women engineers than newcomer men engineers. To address that gap in research, this article addresses the questions: *What gendered experiences and observations do practicing civil engineers have within their first three years in the workplace?* And *How can those experiences be accounted for in a model of organisational socialisation?* Three sets of interviews were conducted with men and women early career civil engineers in the United States. A model was then created to account for the findings. Men and women had different experiences that point to ways in which gender structures organisational socialisation, and those must be accounted for in studies of organisational socialisation.

ARTICLE HISTORY

Received 5 September 2019
Accepted 6 April 2021

KEYWORDS

Gender; organisational socialisation; civil engineering; newcomer; retention

Introduction

In the United States and some European countries, newcomer women engineers leave their careers at higher rates than men in engineering and women in non-STEM careers. In the United States, nearly 40% of women with engineering degrees leave engineering careers (Fouad et al. 2012), and most of those do so within their first five to ten years on the job (Glass et al. 2013). Most who leave, switch to non-STEM jobs (Glass et al. 2013). In the technology sector more generally, the rate at which women leave tech jobs is 45% higher than the rate at which men leave (Hewlett et al. 2014). Looking further out, at thirty-plus years since graduation, only 19% of women engineers are still working in engineering, compared to 39% of men engineers (Corbett and Hill 2015). While comparable statistics are difficult to find, there is evidence that some countries in Europe experience similar trends to the United States. In the United Kingdom, for example, one study found that 57% of women engineers leave the profession before age 45 compared to 17% of men (Women's Engineering Society 2016). In Denmark, 56% of women in STEM are retained compared to 64% of men after seven years (Andersen et al. 2018). Whichever study one looks at, it is clear that engineering workplaces are losing large numbers of their hires, both men and women, to other careers, but women are lost at higher rates than men.

A variety of reasons for attrition from engineering careers have been suggested, such as hostile climates and family norms (SWE 2009; Williams and Ceci 2012; VanAntwerp and Wilson 2015); yet, 'the existing body of research does not yet provide sufficient explanation regarding the departure of both men and women from engineering careers' (VanAntwerp and Wilson 2015, 3). One study revealed that, contrary to popular belief, family and children are not the primary reason women

leave engineering, nor are lower confidence levels (Fouad et al. 2012). There are social forces and practices within the engineering workplace that require critical examination. It has recently been suggested that

the retention deficit in STEM may be due to the team organization of scientific work combined with the attitudes and expectations of co-workers and supervisors who hold more traditional beliefs about the competencies of women in these rapidly changing fields. (Glass et al., 2013, p. 744–745)

Given such prior evidence, there is a clear need to better understand of the gendered nature of newcomer socialisation in engineering workplaces. The two bodies of scholarship summarised in the literature review (*gender in interaction* and *organisational socialisation models*) and have largely operated independently, resulting in little being known about how gender manifests in early career experiences and how that is related to retention. An engineering-specific model of gendered socialisation is needed, one that accounts for gender as structure, not simply as a variable. To that end, this article addresses the questions: *What gendered experiences and observations do practicing civil engineers have within their first three years in the workplace? And How can those experiences be accounted for in a model of organisational socialisation?*

Literature review

Gender in (Inter)action

Gender roles, also called *gender stereotypes* or *gender norms*, are widely-held ‘beliefs about the attributes of women and men’ that inform collective ‘expectations associated with women and men’ (Eagly and Karau 2002, 574). Gender roles are (re)produced through interactions. Interactional gender theory contends that gender as a social structure is constructed and maintained through daily actions and interpersonal interactions (Fenstermaker, West, and Zimmerman 1991; West and Fenstermaker 1995; Lorber 2001). It is important to emphasise that gender roles are not merely differences, but rather a hierarchy of normative traits and behaviours that position women as inferior in many contexts, thus placing them at a disadvantage. Acker (2012) has linked these phenomena to organisations by naming and theorising a ‘gendered substructure’ that is produced and maintained through interactions in the workplace. While widely applied in feminist scholarship because they are an integral part of understanding gender as structure, these insights have been underutilised in engineering education research (Beddoes and Borrego 2011), as well as in organisational socialisation literature.

Such theorising about gender is supported by a large amount of experimental and other empirical data, largely from the field of social psychology. This data has shown that people evaluate women’s work and behaviour differently than men’s, and that those judgements are based on different criteria (Heilman and Haynes 2005). While some behaviours and characteristics are widely associated with women, different behaviours and characteristics are widely associated with men, and those different associations influence expectations and behaviour (Heilman 2001; Eagly and Karau 2002). Behaviours and characteristics generally associated with men include competence, agency, dominance, and influence; behaviours and characteristics generally associated with women include being nice, communal, and service-oriented (Biernat and Fuegen 2001; Carli 2001; Heilman 2001; Babcock and Laschever 2003). Moreover, people can incur negative repercussions when they do not adhere to expected gender roles (Heilman 2001; Eagly and Karau 2002).

The gendered expectations and perceptions of competency mean that women often have to prove their competency in different ways than men (Swim et al. 1989; Eagly, Wood, and Diekmann 2000; Biernat and Fuegen 2001; Ridgeway 2001). One common difference is that women must show more evidence of competence and meet higher standards in order to prove their competency (Foschi 1996, 2000; Biernat and Kobrynowicz 1997; Biernat and Fuegen 2001). Yet, even with that extra effort, women’s performance and work products often receive less favourable evaluations

than men's (Swim et al. 1989; Biernat and Manis 1994; Bagilhole and Goode 2001; Heilman 2001; Ridgeway 2001; Babcock and Laschever 2003; Shields, Zawadzki, and Johnson 2011).

Furthermore, gender roles influence how men and women are expected to communicate and behave, and their ability to influence people (Aries 1996; Carli 2001). Women are expected to communicate and behave in ways that align with feminine stereotypes, that is, they should not be too assertive, direct, competent, or self-interested (Carli 2001; Heilman 2001; Ridgeway 2001; Rudman and Glick 2001). They must perform the necessary *smile work* – the 'symbolic management of behavior to present oneself as being pleasing and agreeable,' 'congenial and cheerful', so as to conform to stereotypically feminine behaviours (Tierney & Bensimon, 1996, p. 83; Bellas 1999, p. 103). Those expectations carry significant power because for women likeability is a factor that shapes work evaluations, communication effectiveness, and influence to a greater extent than men. Women need to be liked to be promoted and to be influential, and they face backlash (i.e. they are disliked and distrusted) when they do not communicate and behave in ways that align with feminine stereotypes (Glick, Zion, and Nelson 1988; Carli 1989, 1990; Carli, LaFleur, and Loeber 1995; Buttner and McEnally 1996; Rudman 1998; Matschiner and Murnen 1999; Rudman and Glick 1999). Furthermore, women have less influence than men when they are a minority in a group of men (Carli 2001). For instance, research shows that in mixed gender meetings, when a woman says something she is ignored, but when a man says the same thing, he is 'heard' (Propp 1995). It is not surprising then that 46% of U.S. women in science, engineering and technology believe that senior management more readily sees men as 'leadership material' (Hewlett et al. 2014).

In these ways, gender norms constitute forms of power-privilege. Privilege is 'systemic, unearned advantages that accrue to individuals because they belong to certain groups' (Beddoes *In press*). Social privilege has been conceptualised as an 'invisible, weightless knapsack of unearned assets; special provisions that can be cashed in (1)', either consciously or unconsciously (citing McIntosh 1988; Middleton, Anderson, and Banning 2009, 295). Power and privilege are intertwined because 'dominant systems of power work to establish and sustain particular advantages' (Sefa Dei, Karumanchery, and Karumanchery-Luik 2007, p. xii). In the context at hand, gender norms serve to give men engineers unearned advantages.

Organizational socialization models

Organisational socialisation is a framework through which to examine how new employees (newcomers) transition from being outsiders who are unfamiliar with the norms, procedures, and culture of an organisation to being organisational insiders who have working mastery of organisational norms, procedures, and culture (Bauer and Erdogan 2012, 97). As a framework, it helps us understand how early career experiences influence career outcomes, including learning, performance, satisfaction, and retention (Korte, Brunhaver, and Sheppard 2015), which is important for understanding different groups' participation in engineering. Various models have been created to depict domain-general organisational socialisation processes (Ashforth, Sluss, and Saks 2007, 457; Bauer et al. 2007, 713; Cooper-Thomas and Anderson 2006, 499; Saks, Uggerslev, and Fassina 2007, 417). These models, their key variable and outcomes, are reviewed in depth in Korte (2009).

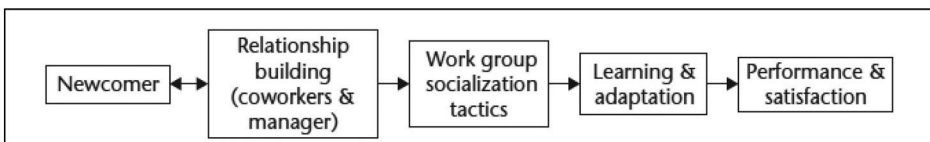


Figure 1. Korte (2009, 295).

Engineering-specific organizational socialization

More recently, as depicted in [Figure 1](#), an engineering-specific model was created by Korte (2009) in order to address limitations he found in prior models.

Korte's model emphasises the pivotal role that relationships within the workgroup play in new-comer engineers' socialisation, a point he found missing from prior literature. The emphasis new-comer engineers 'placed on camaraderie, solidarity, and a sense of belonging was striking ... High-quality relationships with coworkers not only made the work enjoyable and fulfilling but also provided access to higher quality resources (information and learning)' (Korte and Lin 2013, 422–423).

While existing models have helped us understand some aspects of organisational socialisation, they are essentially gender-blind. Gender can only be a variable, something a person is or has. Gender as a social structure, norm, process, or interaction is not accounted for. How could a new model account for gender beyond a variable? That is the query this article takes up. In prior work based on the first set of interviews, Korte's model was expanded to account for privileges, social interactions, and clients (Beddoes *In press*). This article takes that model, presented in [Figure 2](#), as the starting point for creating a model of organisational socialisation that accounts for gender as social structure and norm.

Before moving on, it should be noted that socialisation into engineering does not begin after graduation. Undergraduate and graduate school experiences, and even pre-college experiences, contribute to different socialisation experiences for different groups. For example, many gendered interactions during teamwork in undergraduate engineering courses (Tonso 2007; Beddoes and Panther 2018) and during internships (Male et al. 2018) have been documented. Even prior to that, the toys children are given and the messages they receive from the media and pre-college teachers can produce gendered socialisation experiences that influence career decisions (Gunderson et al. 2012; Smith 2015). Furthermore, engineering staff and students' discourses that deny gender's influence in engineering education socialisation perpetuate the challenges of changing gendered socialisation processes (Powell, Dainty, and Bagilhole 2012; Beddoes 2019a). While pre-college, undergraduate, and graduate school experiences are part of the spectrum of engineering socialisation in the broadest sense of that term, organisational socialisation research differs from university and pre-college research not only because of its workplace context, but also because organisational socialisation has its own survey instruments and models that utilise a specific sets of concepts and constructs. This article's contribution is to show how and why gender should be explicitly incorporated into those concepts and constructs.

Methods

The participants in this study were early career civil engineers. Eighteen participated in the first set of interviews: 12 identified as women and 6 identified as men. Sixteen participated in the second and third sets of interviews: 10 identified as women and 6 identified as men. Demographic details are presented in [Table 1](#). Participants' gender, racial, and ethnic identification came from asking them

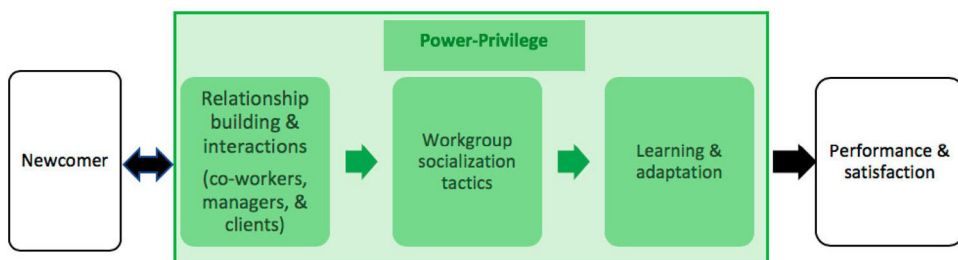


Figure 2. Beddoes (*in press*).

Table 1. Participant characteristics.

Name	Gender ^a	Race or ethnicity ^a	Highest degree
Kari	Woman	White	Bachelors
Lisa	Woman	White	Bachelors
Natalie	Woman	White	Bachelors
Beth	Woman	White and Latina	Masters
Nina	Woman	Latina	Bachelors
Laura	Woman	White	Masters (in progress)
Amy	Woman	Arab and White	Bachelors
Lynnette	Woman	White	Bachelors
Becky	Woman	White	Bachelors
Danielle	Woman	White	Bachelors
Patrick	Man	White	Bachelors
Steven	Man	White	Masters
Tom	Man	White and Hispanic	Bachelors
James	Man	Hispanic	Bachelors
Liam	Man	Hispanic	Masters (in progress)
Carl	Man	White	Bachelors
Margaret	Woman	White	Masters
Helen	Woman	Black	Masters

^aSelf-identified, with no pre-determined categories.

how they self-identify their gender and race or ethnicity with no categories or terms prescribed by the interviewer. This was asked at the end of the first interviews.

The participants worked in different civil and environmental engineering firms around the United States and represented a wide spectrum of specialties within civil engineering, including structures, traffic, roadways, and wastewater management. They graduated from university and began their positions in 2017 and 2018. The participants were recruited primarily through the listservs and social media of national and local engineering organisations, including the Society of Women Engineers, American Society of Civil Engineers, and Solar Decathlon. Recruitment materials invited potential participants to ‘participate in a longitudinal study of newcomer workplace experiences’ and ‘how newcomer civil engineers are socialized into the workplace’.

Three sets of semi-structured qualitative interviews (Singleton and Straits 2009) were conducted by the author in summer 2019, winter 2020, and summer 2020. The interviews were conducted online and audio recorded and transcribed. The first set of semi-structured interviews asked participants to describe first impressions of their workplace, the biggest challenges they had faced in their job, the most surprising thing about their jobs, how their education had prepared them to do their jobs, the biggest change they experienced since starting their jobs, how they would describe the culture or environment of their workplaces, and if they thought there was anything unfair or unjust about their workplaces (Beddoes 2019b). The second and third sets of interviews asked participants to describe what they had learned and what their biggest challenges had been since the previous interview, what they wish they had known before graduating, as well as further explored their individual responses to organisational socialisation surveys they had completed in-between the two sets of interviews.

Data analysis was conducted by the author and occurred in three stages. First, for all transcripts (men and women), open and axial coding methods (Charmaz 2006) were used to identify and categorise any experiences and observations that could be related to gender. Determination of whether or not something could be related to gender was based on the author’s expertise in gender studies and extensive knowledge of the literature on gender in engineering, (acquired and evidenced by educational qualifications, research, and teaching on these topics). Second, the types of gendered experiences and observations identified were compared to existing organisational socialisation models to determine if the existing models adequately accounted for the gendered findings identified in stage one. As is explained further in the Findings, the existing models did not adequately account for the gendered findings identified in stage one. Therefore, the third stage of analysis

entailed creating a new model that incorporated missing elements and accounted for the ways in which gender manifested in these participants' experiences. Compared to previous models, the resulting model accounts for more complexity and more elements in which gender manifests and socialisation experiences differ.

Findings and discussion

Numerous gendered facets of civil engineering workplaces were experienced and observed by participants. These experiences and observations point to ways in which gender structured newcomer civil engineers' socialisation. This section presents and discusses a new model of organisational socialisation, depicted in Figure 3, that accounts for these phenomena. Readers may notice that quotations are primarily from women; that is because it was women's interviews where the quotable evidence surfaced. The evidence from the men's interviews consists primarily in the absence of similar challenges and stories in their data.

The first change to note in the new model is that the socialisation process does not progress linearly. Rather, it occurs as multidirectional and interdependent connections. Each element influences the other three and is acted upon by the other three. The second major change is that gender mediates the relationships between the elements in complex multidirectional ways. The remainder of this section discusses each element in turn.

Power-privilege structures experiences and outcomes

Gender was the primary power-privilege that structured organisational socialisation experiences and outcomes in this study. In all of the ways explained in the literature review, gender was the dominant form of power-privilege that emerged as salient to participants' experiences in this study. Race, sexuality, religion, (dis)ability, and nationality also shaped participants' experiences, and perhaps outcomes, but these facets of identity also intersected with gender and cannot be seen as separate from it. A full intersectional analysis is beyond the scope of this article, but one such analysis of the first interviews has been presented elsewhere (Beddoes [in press](#)). In each of the elements discussed below, we can see gendered power-privilege operating.

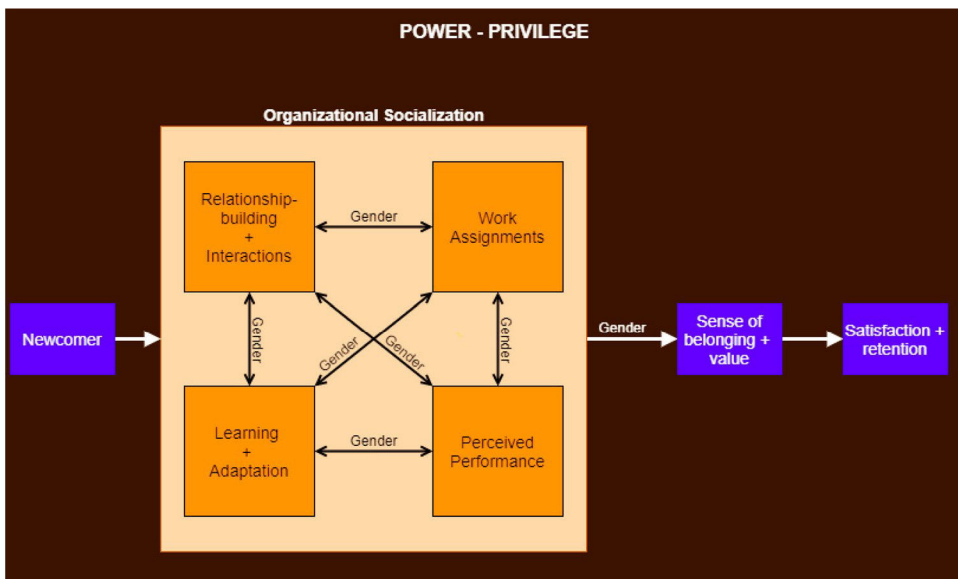


Figure 3. Gender structures organisational socialisation processes and outcomes.

Relationship-building and interactions

Korte's model included Relationship-building with coworkers and managers. In prior work, I added *interactions* because of the salience of individual interactions even when they were not part of relationship-building and to tie the model to interactional gender theory, and I added *clients* to the list of salient interactions because the data showed that was salient (Beddoes *in press*). In the analysis at hand, there were five distinct ways in which gender structured relationship-building and interactions. The first was the gender norm that women are not seen as competent in male-dominated fields and not taken seriously as engineers. For instance, in Lisa's first interview, she described meetings with clients in which the client would only speak to the man in the group even though the man was new to the project and knew nothing about it yet. In her second interview, she reported that subsequently they had had to change project managers so that the client got to deal with a man, even though Lisa's team of all women were still doing the work behind the scenes:

We have a client that will, if we bring a man to a meeting, he's immediately the person they talk to. It would be like a [junior] level engineer, and my supervisor would ask [the client] a question, and [the client] would turn and answer to the boy. Like, what?! And we had to switch project managers, to a man, because it's like we weren't getting anywhere. We really needed someone else to come and take this over because we [the all women group] weren't getting anywhere. Yeah, and it's clearly because we all have vaginas. And it worked out fine like that project went fine. We just weren't client-facing. We still did all the work. [The client] just got to deal with a guy.

She said she felt 'like people were taking what I was saying as an engineer, they took it really lightly. They kept thinking that what I was doing was not correct, and they have no basis to believe that other than the fact that I'm a woman'. Nina felt like her boss ignored her, and she left her company after one year. In response to the question in the first interview about what her biggest challenge had been since she began her position, Nina said: 'I don't feel like my voice is heard.' In contrast, in her second interview, Nina said that one of the things she most liked about her new organisation compared to one she left was that they trusted her: 'I like it a lot more than my old company. They have given me so much more responsibility, a lot more trust.' In response to a question in the first interview about if there was anything else she thought was unfair or unjust about her workplace, Lynnette said:

... I definitely do think that the men treat me differently, and I don't know if it is because I am the newest one there or because I am female, but they don't necessarily trust the work that I do. And I can give a suggestion and they kind of like brush it off their shoulder, and they are like 'Ya, that's cool and all but we're going to go a different way.' And then somebody else can make the same suggestion, and it would be like 'Oh, why didn't I think of that before?'

In another part of the interview, Lynnette echoed that: 'you have to prove yourself more being a woman'. These experiences mirror findings from social psychology research that has demonstrated that presumption of competence is not given to women as it is to men and findings from women in engineering research that women need to constantly prove their competence in ways men do not. For instance, research shows that in mixed-sex meetings, when a woman says something she is ignored, but when a man says the same thing, he is 'heard' (Propp 1995).

The second way in which gender structured relationship-building and interactions was that women are perceived and expected to be nicer, more communal, more service-oriented than men, and to communicate and behave in ways that align with feminine stereotypes. When Lisa did not sound 'chipper' or 'girly' on the phone, her client asked her if she was depressed and then complained to her supervisor:

Lisa: I have another client that calls me and if I'm not like super chipper and girly sounding - because I have a very deep voice to begin with - And if I call and I'm not [speaking in a fake, high pitched voice], literally, that's how I have to talk to him, that's like a total octave above my natural voice. But he literally, if I don't do that - to all of us, he's done it to my other coworker too that has like a deeper voice - He'll say like, 'Oh, are you depressed today? You should be more excited.' And I finally had it. I don't know what I said but it was something like 'Am I depressed because I don't sound girly?' and he was like, 'Uhhh'.

When I asked what happened after the client complained, Lisa said:

I don't know what she [my supervisor] said to him, but I wasn't like slapped on the wrist or anything, but she was like we just gotta keep this client, so if we all have to answer the phone with an elated voice, we gotta do it.

Lisa has also been told by supervisors that she needs to be more agreeable and less aggressive. Lynnette's supervisor told her he was not happy with her because she was hired to be a 'bubbly personality' in the office and she was not living up to that role:

... my boss even told me, 'We hired you to be this bubbly personality'. And I'm like, some days I'm not going to be this big bubbly personality, I have bad days just like you do, I wake up and I'm sick, I'm not going to be that big ray of sunshine every day. I might try my best to put on a smile and be one, but you can't expect someone to constantly put on a show for everybody. And if every other person isn't putting on a show for you, why do you expect the only woman to put on a show for you. It feels like a sexist thing when he pulled me aside and said, 'we expected you to be this big personality in the office and brighten everyone's day.' And I'm like, I don't see you saying that to the guys.

At a previous company for which she worked during an internship, a coworker told Lynnette that he liked seeing her smiling face on the way to the bathroom. These findings therefore echo past research showing that, for women, the ability to build successful relationships depends on performing femininity properly and doing the necessary 'smile work'.

The third way in which gender structured relationship-building and interactions was sexual harassment. A coworker sexually harassed Amy when she started her position. Lynnette's coworkers and supervisor made sexually suggestive comments and often said things like 'We have to be careful what we say around Lynnette', which makes her feel alienated and not want to go to work every day. For example, she recounted a time when:

There is one of the guys who just got a new truck. So now every guy in the office has a truck and he made a comment. One guy said that his truck was newer so it's nicer and he made a comment about how his truck is bigger, so it's nicer. And he was like, 'See, size does matter, right Lynnette?'

It stands to reason that it is going to be more difficult to build successful relationships with coworkers who are sexually harassing you. All of this echoes prior findings on sexual politics of engineering workplaces (Mills et al. 2014).

The fourth way in which gender structured relationship-building and interactions was through overt hostility toward non-dominant groups, including minority racial groups. For example, a coworker in Lisa's office hung a confederate flag at his desk, and no one said anything about it until she told HR it needed to be taken down. Lisa also witnessed a man being verbally abusive to a woman in her office and reported it to HR, who did nothing. Patrick reported multiple instances of his coworkers making transphobic, homophobic, and racist comments. And there too, these acts went unchallenged and seemed to be the company norm. A white co-worker made affirmative action comments about Helen, who was Black. These hostile interactions show that people of colour, and groups outside of white, straight, cisgender men can face hostile environments that will make developing positive relationships difficult. They also highlight the importance of further research on intersectionality in engineering organisational socialisation.

The fifth way in which gender structured relationship-building and interactions was through the formal and informal networking and the 'boys' club' that privileges primarily white men (Elting 2018; Diezmann and Grieshaber 2019). Formal and informal networks involved in socialisation have serious implications for career success because men's inclusion means they have more access to information, collaboration, opportunities, mentoring and support (Bagilhole and Goode 2001). However, the advantages men accrue through gendered socialisation dynamics most often are interpreted as happenstance, or being in the right place at the right time, rather than being seen as a systemic gender advantage: 'For men who more usually find themselves in influential company, the process of networking, mentoring and sponsorship need not necessarily be a conscious activity' (Bagilhole and Goode 2001, 173). In this study, evidence of the 'boys' club' included Margaret

observing that men coworkers went out to lunch and bowling together and did not invite her: 'There's a little bit of a thing where the guys hang out together and go bowling, but there are enough girls that I don't feel completely singled out and by myself when that does happen.' It included Helen being ignored entirely by coworkers. It included Lynnette's coworkers socialising outside the office without her, including in activities like hunting. When explaining how people in leadership positions differed from her, Laura said that most supervisors are men and that she only sees men being groomed for leadership positions:

I guess the most obvious difference is that they're all men. But also I feel like a lot of them have almost been being groomed for their positions from the get-go. Like, I can probably pick out a few people [men] on my level, who will go on to be considered for manager or considered for a project manager before someone else. And I don't think it's directly related to your performance. I think it's related to the opportunities you're presented with ... But as far as the supervisors and managers, I don't think if anyone had to pick out [people being groomed] they would think I am in that line up.

In her first interview, Lynnette discussed how being the only woman in the office affected her:

... internally it brings up some questions every once in a while in my own mind of, just the way that they joke around with each other differently than they joke around with me, and I sometimes feel that may be my boss favoring the men versus me, being the only woman ... I think the relationships are a little different based on gender.

She went on to say that this is 'something you get used to in engineering'. A theme through each of Lynnette's interviews was that she does not feel she connects with or can be herself around her older, all men coworkers. In her second interview, she expressed frustration about not knowing how to change this feeling of being left out of a boy's club: 'I mean, I watch college football. I talk football with them all the time. So, like, I don't know. I mean what more do you have to have as men's talk during office meetings than football?' Additionally, when I asked if she had ever thought about reporting any of her supervisor's or coworkers' sexist behaviour, Lynnette said that she did not think any coworkers would 'have her back' or support her stories if she did make a complaint because of how they were friends with the supervisor.

Work assignments

Gendered divisions of labour, or occupational segregation, were not accounted for in previous organisational socialisation models. However, gendered divisions of labor emerged as an important theme for some of the women. Therefore, this element is a new addition to the model because it is integral to other elements of *learning and adaptation* and *relationship building and interactions*.

Before Amy left her first company, she noticed on multiple occasions that a workgroup peer who was a man was being given assignments she wanted, site visit work specifically. She also noticed that a woman who was hired was not given a Project Manager position even though she appeared as qualified as the men in that role at her company. Beth had to request multiple times that she wanted to learn a specific design task because all her supervisor wanted her to do was write reports and she felt like she was falling behind technically. As noted, Laura reported noticing that most supervisors in the field are men and she sees only her men peers being 'groomed' for leadership positions. Lynette was the only woman who worked in her office. The office did not have a receptionist, so Lynnette was made to answer all phone calls that came into the office because her supervisor believed that clients wanted to hear a nice, cheery voice when they called. She was also made to plan and organise the office Christmas party. These are clear examples of women's work or task assignments differing from men's in ways that reinforce gendered divisions of labour and gender norms of women as secretaries, as not suited for field work, and as not suited for leadership roles.

Perceived performance

In the previous model, *performance and satisfaction* was the final outcome box. In the new model, this was modified in two ways. Performance was made an antecedent of *satisfaction and retention*

and it was changed to *perceived performance* to reflect the fact that performance is not objective and that how one's performance is perceived affects satisfaction and retention. Several instances of gendered performance evaluations emerged in the interviews. Lynnette's supervisor told her he was not happy with her because she was hired to be a 'bubbly personality' in the office and she was not living up to that role. Her story recounted above in *relationships and interactions* section occurred at a meeting in which her supervisor told her he was not happy with her performance. As noted, Lisa's client and supervisors have directly linked her work performance to her performance of femininity. While somewhat different, natalie has overheard coworkers talking negatively about coworkers who leave early for family obligations, even though her company's official policies support such work-life balance decisions.

Certainly not all women felt their performance evaluations were biased; however, there were clear examples of women's perceived performance being influenced by gender norms in negative ways, specifically by how they perform their feminine gender role. No men in the study reported anything similar. This fits previously identified social-psychological patterns wherein women's perceived performance is directly tied to performing femininity correctly, and to not being given the same presumption of competence as men. Those norms carry significant power, because for women, likeability is a bigger factor in work evaluations, communication effectiveness, and influence. As noted, prior empirical evidence shows that women, but not men, need to be liked to be promoted and to be influential, and they face backlash (i.e. they are disliked and distrusted) when they do not communicate in ways that align with feminine stereotypes.

Learning and adaptation

Learning and adaptation were present in the existing model. However, the ways in which gender structured learning and adaptation were not. It is clear from the findings presented thus far that men and women are learning and adapting to different norms, as well as learning different engineering skills. The long list of norms that only women were learning and adapting to included: learning that they have to work harder and continuously to prove their competence, that they are not seen as engineers, that they are not given presumption of competence, that people of their gender are not in the leadership positions and not being groomed for those positions, that they must perform femininity properly and that evaluation of their performance depends on it, that sexual harassment is something to quietly tolerate, and that you do not belong in the 'boy's club'. Gender as structure is also evidenced in the fact that all newcomer engineers, not just women, were learning norms and adapting to workplaces in which overt hostility toward people other than straight, white, cisgender men went unchallenged. Furthermore, because some women were not given the same opportunities for field work or technical skill development as their men peers, their learning of engineering technical knowledge was actually negatively impacted.

Lynnette articulated how her sense of alienation from her supervisor affected her ability to learn. Recall that he had made sexist comments and that Lynnette never felt like she connected with him. Her comment directly connects her ability to have a relationship with him to her ability to learn:

That's pretty much not knowing if my boss is going to relate something to some sexist comment or if it's going to be a genuine conversation with him. It's hard to know whether I can actually sit down and talk to him or if it's going to be like 'Oh Lynnette is in a mood because she is a female' type thing. That is what I feel, it's like they rate me based on ... [how bubbly I am] ... I don't know whether I'm respected enough to be able to have a genuine conversation with him and ask for help when I need help.

Sense of belonging and value

Sense of belonging and value was not included in the previous model, although to some extent similar concepts are covered under terms such as 'integration' and 'adaptation' in prior literature. This element was added because it emerged as an important theme for some participants and

was a direct antecedent to *satisfaction and retention*. Due to the gendered experiences described in the other elements, some women felt like they did not belong in their organisations and/or that they were not valued as engineers. As one example, in her second interview, Lynette expanded upon how being the only woman in the office affected her sense of belonging and connection to the organisation:

Communication, even with personal life, it's hard to be like 'hey I have some stuff coming up and I need some personal time'. I don't feel comfortable going to my boss. Like even when I had to take off work because I was sick, I feel weird texting him 'hey I'm sick today'. I just don't feel like I have that connection, being the only female in the office ... I can't relate to my coworkers on a personal level. And since there are only six of us in the office everybody else is close personally. And so I do feel that if I have work problems, or even personal problems, like I just went through a break up, and not being able to explain the situation to my coworkers, it definitely did impact my work life, like how I performed, and not being able to tell anybody at work because I don't think they really care, has been difficult. ... Whether it's to take some personal time or reach out to a coworker during lunch or something when you're having a difficult day, I don't feel like I have that and because of that it affects my work. And then I have issues at work with my boss saying your performance is a little down I guess. But if I ask for help, I feel like they don't want to hear that I need help, whether it's work or personal life.

Becky similarly felt that being in a male-dominated office she could not relate to her co-workers or talk to them as freely as she could with another woman. Helen described 'loneliness' and feeling like an outsider stemming from being the only Black person in her office, being ignored by coworkers who spoke to her white peers but not her, being told she would only get a position or into a certain graduate programme because of affirmative action, and consequently never felt a sense of belonging in her office. Furthermore, Patrick and Lisa's coworkers' racist, homophobic, transphobic, and anti-immigrant comments and actions are clear examples of practices that could lead many who did not share those views to feel they did not belong in those workplaces, and/or were not valued if they belonged to one of the targeted groups.

Satisfaction and retention

The elements discussed above are antecedents to the satisfaction and retention of newcomer civil engineers. As noted in the Introduction, engineering firms suffer from high rates of attrition of early career engineers. In this study, participants who did not feel a sense of belonging and value in their organisations were more likely to leave or to be thinking about leaving than those who felt a sense of belonging and value, and those participants who left or were thinking of leaving were the women who reported problems described above. As of the third interview, three women had left their original positions, but were in other civil engineering organisations, and one had left engineering entirely. Another anticipated leaving engineering entirely in the future. Two other women who participated in the first round of interviews subsequently left the study by ceasing to respond to my emails. I do not know if they stopped participating in the study because they left their positions and/or civil engineering, or because they simply did not want to participate in the study any longer. One of those participants was Helen, the Black woman whose coworkers ignored her and who felt very much like she did not belong in her organisation. All of the men, on the other hand, were still in their original positions, although two were considering leaving at the time of the third interview. One of those was considering leaving because of his company's handling of the COVID-19 pandemic, which he said made him feel like they did not value their employees. At one point, Lynette specifically said that if she left civil engineering entirely it would be because of the sexism in her company that made her feel like she did not belong and was not valued.

These findings, and the new model, align with past research showing the interconnectedness of socialisation and competency development. Blandin (2012) identified three dimensions of competence that developed during an engineering apprenticeship programme. The cognitive dimension operated at an individual level and included measurable competencies and self-efficacy. The identity dimension operated at the work group level and included feelings of belonging, others' judgments of competence, and integration into the work group. The institutional dimension operated at the

institution level and included title, position, salary and ‘field of action’ (Blandin 2012, 60). Each of these dimensions of competence was present in my data as well, and clearly tied to organisational socialisation. What my findings add is insight into the ways that the relationships between organisational socialisation and competence development can be gendered. Also, similarities between Blandin’s findings, which were from the automotive industry in France, and mine, which were from civil engineering in the U.S., suggest some commonalities across engineering disciplines and national contexts.

Implications for engineering education

Incorporating findings from this study into engineering courses, particularly final year courses, could benefit recent graduates in several ways. While awareness of these issues will not be sufficient to change them, it seems like a necessary place to start. Teaching students about these social patterns could: (1) minimise the frequency with which they inadvertently perpetuate them in their future workplaces, (2) help students be better prepared for situations they may encounter and have more realistic expectations of the workplace, (3) let students know that it is not just them if they do encounter these situations, and (4) help students better see their own privileges operating. The latter is an important place to start for challenging the myth of meritocracy in engineering education. In the coming years, findings from this project will be used to create materials for lessons that can be incorporated and taught in capstone engineering courses to precisely those ends. Additionally, adapting the lens of power-privilege in other diversity, equity, and inclusion initiatives at universities can be an important way to re-orient those initiatives away from deficit model assumptions that do nothing to change structures, policies, or cultures.

Conclusion

Gender structures organisational socialisation experiences in multiple and complex ways. Accounting for those mechanisms in an organisational socialisation model can help us understand the high rates of attrition from the engineering workforce, as well continued dominance of exclusionary norms in engineering workplaces. It also advances the field of organisational socialisation scholarship by demonstrating why gender should not be treated only as a variable. Reports of the gendered experiences of engineers who began their careers in decades past (McIlwee and Robinson 1992; Roberts and Ayre 2002; Faulkner 2009a, 2009b; Hatmaker 2012, 2013; Ayre, Mills, and Gill 2013; Mills et al. 2014; Ettinger, Conroy, and Barr II 2019) reveal that many of the same problems have persisted for a long time. This raises two important points. First, the belief that women no longer face these challenges, which is held by some engineers today (Ettinger, Conroy, and Barr II 2019), is a myth. Second, despite the fact that these problems have been known about for decades, they have never been brought to bear on organisational socialisation models. This article demonstrates that gender needs to be accounted for as structure – not merely as a variable – in any study of engineering socialisation.

Acknowledgments

I sincerely thank my participants for sharing their time and experiences with me to make this work possible, Drs Aditya Johri and Russell Korte for providing feedback on drafts of this article, and Dr Corey Schimpf for rendering the digital version of Figure 3. I am also grateful for the feedback from two anonymous reviewers who helped improve the article. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the National Science Foundation.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This material is based upon work supported by the National Science Foundation under grant EEC #1929727.

Notes on contributor

Kacey Beddoes holds a PhD in Science and Technology Studies from Virginia Tech. Currently she is a Project Director in the San Jose State University College of Engineering Dean's Office, Managing Editor of *Engineering Studies*, and Associate Editor of the *Australasian Journal of Engineering Education*. She is also Past Chair of the European Society for Engineering Education (SEFI) Working Group on Gender and Diversity and Past Program Chair of the American Society for Engineering Education's Public Policy Division. Her current research focuses on gender, peer review, mental wellness, and interdisciplinarity in engineering and engineering education. Further information about her work can be found on her website at www.sociologyofengineering.org.

References

- Acker, J. 2012. "Gendered Organizations and Intersectionality: Problems and Possibilities." *Equality, Diversity and Inclusion: An International Journal* 31 (3): 214–224.
- Andersen, J. R., K. Baroudy, L. Moller, P. Rype, P. H. Andersen, and T. Duvold. 2018. *Bridging the Talent Gap in Denmark: Insights from female representation in STEM*. McKinsey & Company and Innovation Fund Denmark. <https://innovationsfonden.dk/sites/default/files/2018-10/gender-diversity-in-denmark.pdf>.
- Aries, E. 1996. *Men and Women in Interaction: Reconsidering the Differences*. Oxford: Oxford University Press.
- Ashforth, B. E., D. M. Sluss, and A. M. Saks. 2007. "Socialization Tactics, Proactive Behavior, and Newcomer Learning: Integrating Socialization Models." *Journal of Vocational Behavior* 70 (3): 447–462.
- Ayre, M., J. Mills, and J. Gill. 2013. "'Yes, I do Belong': The Women Who Stay in Engineering." *Engineering Studies* 5 (3): 216–232.
- Babcock, L., and S. Laschever. 2003. *Women Don't Ask: Negotiation and the Gender Divide*. Princeton: Princeton University Press.
- Bagilhole, B., and J. Goode. 2001. "The Contradiction of the Myth of Individual Merit, and the Reality of a Patriarchal Support System in Academic Careers." *European Journal of Women's Studies* 8: 161–180.
- Bauer, T. N., T. Bodner, B. Erdogan, D. M. Truxillo, and J. S. Tucker. 2007. "Newcomer Adjustment During Organizational Socialization: A Meta-analytic Review of Antecedents, Outcomes, and Methods." *Journal of Applied Psychology* 92 (3): 707–721.
- Bauer, T. N., and B. Erdogan. 2012. "Organizational Socialization Outcomes: Now and Into the Future." In *The Oxford Handbook of Organizational Socialization*, edited by C. R. Wanberg, 97–112. Oxford: Oxford University Press.
- Beddoes, K. 2019a. "Agnotology." *Gender, and Engineering: An Emergent Typology. Social Epistemology* 33 (2): 124–136.
- Beddoes, K. 2019b. *First Year Practicing Civil Engineers' Challenges*. Australasian Association for Engineering Education Annual Conference, Brisbane, Australia.
- Beddoes, K., and M. Borrego. 2011. "Feminist Theory in Three Engineering Education Journals: 1995–2008." *Journal of Engineering Education* 100 (2): 281–303.
- Beddoes, K. In press. "Examining Privilege in Engineering Socialization Through The Stories of Newcomer Engineers." *Engineering Studies*.
- Beddoes, K., and G. Panther. 2018. "Gender and Teamwork: An Analysis of Professors' Perspectives and Practices." *European Journal of Engineering Education* 43 (3): 330–343.
- Bellas, M. L. 1999. Emotional Labor in Academia: The Case of Professors. *Annals of the American Academy of Political and Social Science* 561: 96–110.
- Biernat, M., and K. Fuegen. 2001. "Shifting Standards and the Evaluation of Competence: Complexity in Gender-based Judgment and Decision Making." *Journal of Social Issues* 57 (4): 707–724.
- Biernat, M., and D. Kobrynowicz. 1997. "Gender- and Race-based Standards of Competence: Lower Minimum Standards but Higher Ability Standards for Devalued Groups." *Journal of Personality and Social Psychology* 72: 544–557.
- Biernat, M., and M. Manis. 1994. "Shifting Standards and Stereotype-based Judgments." *Journal of Personality and Social Psychology* 66 (1): 5–20.
- Blandin, B. 2012. "The Competence of an Engineer and How It Is Built Through an Apprenticeship Program: A Tentative Model." *International Journal of Engineering Education* 28 (1): 57–71.
- Buttner, E. H., and M. McEnally. 1996. "The Interactive Effect of Influence Tactic, Applicant Gender, and Type of Job on Hiring Recommendations." *Sex Roles* 34: 581–591.
- Carli, L. L. 1989. "Gender Differences in Interaction Style and Influence." *Journal of Personality and Social Psychology* 56: 565–576.
- Carli, L. L. 1990. "Gender, Language, and Influence." *Journal of Personality and Social Psychology* 59: 941–951.
- Carli, L. L. 2001. "Gender and Social Influence." *Journal of Social Issues* 57 (4): 725–741.

- Carli, L. L., S. J. LaFleur, and C. C. Loeber. 1995. "Nonverbal Behavior, Gender, and Influence." *Journal of Personality and Social Psychology* 68: 1030–1041.
- Charmaz, K. 2006. *Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis*. Thousand Oaks: Sage.
- Cooper-Thomas, H. D., and N. Anderson. 2006. "Organizational Socialization: A New Theoretical Model and Recommendations for Future Research and HRM Practices on Organizations." *Journal of Managerial Psychology* 21 (5): 492–516.
- Corbett, C., and C. Hill. 2015. *Solving the Equation: The Variables for Women's Success in Engineering and Computing* (pp. 1–159). American Association of University Women (AAUW). <https://www.aauw.org/app/uploads/2020/03/Solving-the-Equation-report-nsa.pdf>.
- Diezmann, C., and S. Grieshaber. 2019. "The Boys' Club." In *Women Professors: Who Makes It and How?*, edited by C. Diezmann and S. Grieshaber, 137–154. Singapore: Springer.
- Eagly, A. H., and S. J. Karau. 2002. "Role Congruity Theory of Prejudice Toward Female Leaders." *Psychological Review* 109: 573–598.
- Eagly, A. H., W. Wood, and A. B. Diekmann. 2000. "Social Role Theory of Sex Differences and Similarities: A Current Appraisal." In *The Developmental Psychology of Gender*, edited by T. Eckes and H. M. Trautner, 123–173. Mahwah, NJ: Erlbaum.
- Elting, L. 2018. How to Navigate A Boys' Club Culture. *Forbes*. <https://www.forbes.com/sites/lizelting/2018/07/27/how-to-navigate-a-boys-club-culture/#71f820334025>.
- Ettinger, L., N. Conroy, and W. Barr II. 2019. "What Late-career and Retired Women Engineers Tell Us: Gender Challenges in Historical Context." *Engineering Studies* 11: 217–242.
- Faulkner, W. 2009a. "Doing Gender in Engineering Workplace Cultures. I. Observations for the Field." *Engineering Studies* 1 (1): 3–18.
- Faulkner, W. 2009b. "Doing Gender in Engineering Workplace Cultures. II. Gender in/Authenticity and the in/Visibility Paradox." *Engineering Studies* 1 (3): 169–189.
- Fenstermaker, S., C. West, and D. Zimmerman. 1991. "Gender Inequality: New Conceptual Terrain." In *Gender, Family and Economy: The Triple Overlap*, edited by R. Lesser-Blumberg, 289–307. Thousand Oaks: Sage.
- Foschi, M. 1996. "Double Standards in the Evaluation of Men and Women." *Social Psychology Quarterly* 59 (3): 237–254.
- Foschi, M. 2000. "Double Standards for Competence: Theory and Research." *Annual Review of Sociology* 26: 21–42.
- Fouad, N. A., R. Singh, M. E. Fitzpatrick, and J. P. Liu. 2012. *Stemming the Tide: Why Women Leave Engineering* (pp. 1–64). Milwaukee: University of Wisconsin-Milwaukee.
- Glass, J. L., S. Sassler, Y. Levitte, and K. M. Michelmore. 2013. "What's So Special About STEM? A Comparison of Women's Retention in STEM and Professional Occupations." *Social Forces* 92 (2): 723–756.
- Glick, P., C. Zion, and C. Nelson. 1988. "What Mediates Sex Discrimination in Hiring Decisions?" *Journal of Personality and Social Psychology* 55: 178–186.
- Gundersen, E. A., G. Ramirez, S. C. Levine, and S. L. Beilock. 2012. "The Role of Parents and Teachers in the Development of Gender-related Math Attitudes." *Sex Roles* 66 (3/4): 153–166.
- Hatmaker, D. M. 2012. "Practicing Engineers: Professional Identity Construction Through Role Configuration." *Engineering Studies* 4 (2): 121–144.
- Hatmaker, D. M. 2013. "Engineering Identity: Gender and Professional Identity Negotiation among Women Engineers." *Gender, Work & Organization* 20 (4): 382–396.
- Heilman, M. E. 2001. "Description and Prescription: How Gender Stereotypes Prevent Women's Ascent Up the Organizational Ladder." *Journal of Social Issues* 57 (4): 657–674.
- Heilman, M. E., and M. C. Haynes. 2005. "No Credit Where Credit Is Due: Attributional Rationalization of Women's Success in Male-Female Teams." *Journal of Applied Psychology* 90 (5): 905–916.
- Hewlett, S. A., L. Sherbin, F. Dieudonné, C. Fagnoli, and C. Fredman. 2014. *Athena 2.0: Accelerating Female Talent in Science, Engineering and Technology* (pp. 1–72). Center for Talent Innovation. <http://www.talentinnovation.org/publication.cfm?publication=1420>.
- Korte, R. F. 2009. "How Newcomers Learn the Social Norms of an Organization: A Case Study of the Socialization of Newly Hired Engineers." *Human Resource Development Quarterly* 20 (3): 285–306.
- Korte, R., S. R. Brunhaver, and S. Sheppard. 2015. "(Mis)Interpretations of Organizational Socialization: The Expectations and Experiences of Newcomers and Managers." *Human Resource Development Quarterly* 26 (2): 185–208.
- Korte, R., and S. Lin. 2013. "Getting on Board: Organizational Socialization and the Contribution of Social Capital." *Human Relations* 66 (3): 407–428.
- Lorber, J. 2001. *Gender Inequality*. Los Angeles: Roxbury.
- Male, S. A., A. Gardner, E. Figueroa, and D. Bennett. 2018. "Investigation of Students' Experiences of Gendered Cultures in Engineering Workplaces." *European Journal of Engineering Education* 43 (3): 360–377.
- Matschiner, M., and S. K. Murnen. 1999. "Hyperfemininity and Influence." *Psychology of Women Quarterly* 23: 631–642.
- McIlwee, J. S., and J. G. Robinson. 1992. *Women in Engineering: Gender, Power, and Workplace Culture*. Albany: State University of New York Press.

- McIntosh, P. 1988. *White Privilege and Male Privilege: A Personal Account of Coming to See Correspondences Through Work in Women's Studies: Vol. ERIC Document Reproduction Service No. ED 335 262*. Wellesley: Wellesley Center for Research on Women.
- Middleton, V. A., S. K. Anderson, and J. H. Banning. 2009. "The Journey to Understanding Privilege: A Meta-narrative Approach." *Journal of Transformative Education* 7 (4): 294–311.
- Mills, J. E., S. Franzway, J. Gill, and R. Sharp. 2014. *Challenging Knowledge, Sex and Power: Gender, Work and Engineering*. New York: Routledge.
- Powell, A., A. Dainty, and B. Bagillhole. 2012. "Gender Stereotypes among Women Engineering and Technology Students in the UK: Lessons from Career Choice Narratives." *European Journal of Engineering Education* 37 (6): 541–556.
- Propp, K. M. 1995. "An Experimental Examination of Biological Sex as a Status cue in Decision-making Groups and Its Influence on Information Use." *Small Group Research* 26 (4): 451–474.
- Ridgeway, C. L. 2001. "Gender, Status, and Leadership." *Journal of Social Issues* 57 (4): 637–655.
- Roberts, P., and M. Ayre. 2002. "Did she Jump or was she Pushed? A Study of Women's Retention in the Engineering Workforce." *International Journal of Engineering Education* 18 (4): 415–421.
- Rudman, L. A. 1998. "Self-promotion as a Risk Factor for Women: The Costs and Benefits of Counterstereotypical Impression Management." *Journal of Personality and Social Psychology* 74: 629–645.
- Rudman, L. A., and P. Glick. 1999. "Feminized Management and Backlash Toward Agentic Women: The Hidden Costs to Women of a Kinder, Gentler Image of Middle Managers.." *Journal of Personality and Social Psychology* 77: 1004–1010.
- Rudman, L. A., and P. Glick. 2001. "Prescriptive Gender Stereotypes and Backlash Toward Agentic Women." *Journal of Social Issues* 57: 743–762.
- Saks, A. M., K. L. Uggerslev, and N. E. Fassina. 2007. "Socialization Tactics and Newcomer Adjustment: A Meta-analytic Review and Test of a Model." *Journal of Vocational Behavior* 70 (3): 413–446.
- Sefa Dei, G. J., L. L. Karumanchery, and N. Karumanchery-Luik. 2007. *Playing the Race Card: Exposing White Power and Privilege*. New York: Peter Lang Publishing.
- Shields, S. A., M. J. Zawadzki, and R. N. Johnson. 2011. "The Impact of the Workshop Activity for Gender Equity Simulation in the Academy (WAGES–Academic) in Demonstrating Cumulative Effects of Gender Bias.." *Journal of Diversity in Higher Education* 4 (2): 120–129.
- Singleton, R. A., and B. C. Straits. 2009. *Approaches to Social Research (Fifth)*. Oxford: Oxford University Press.
- Smith, N. L. 2015. "Built for Boyhood? A Proposal for Reducing the Amount of Gender Bias in the Advertising of Children's Toys on Television." *Vanderbilt Journal of Entertainment and Technology Law* 17 (4): 991–1049.
- Society of Women Engineers (SWE). 2009. *The Society of Women Engineers National Survey about Engineering* (pp. 1–31). Society of Women Engineers.
- Swim, J., E. Borgida, G. Maruyama, and D. G. Meyers. 1989. "Joan McKay Versus John McKay: Do Gender Stereotypes Bias Evaluations?" *Psychological Bulletin* 105: 409–429.
- Tierney, W. G., and E. M. Bensimon. 1996. *Promotion and Tenure: Community and Socialization in Academe*. Albany: State University of New York Press.
- Tonso, K. L. 2007. *On The Outskirts of Engineering: Learning Identity, Gender, and Power via Engineering Practice*. Rotterdam: Sense.
- VanAntwerp, J. J., and D. Wilson. 2015. *Difference Between Engineering Men and Women: How and Why They Choose What They Do during Early Career*. American Society for Engineering Education Annual Conference, Seattle, WA.
- West, C., and S. Fenstermaker. 1995. "Doing Difference." *Gender and Society* 9 (1): 8–37.
- Williams, W. M., and S. J. Ceci. 2012. "When Scientists Choose Motherhood." *American Scientist* 100: 138–145.
- Women's Engineering Society. 2016. *RETURN Project Final Report Career Break Support for Professional Engineering Institution (PEI) Members*. Stevenage: Women's Engineering Society. <https://www.wes.org.uk/sites/default/files/RETURN%20Project%20Report%20Final%20March%202016%20Final.pdf>.