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Promoted Up But Also Out? The Unintended Consequences of Increasing Women's Representation in Managerial Roles in Engineering

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Abstract. Engineering remains one of the most highly and persistently sex segregated occupations in the United States. Though extant literature submits that women's increased access to managerial positions in male-dominated occupations should represent an important strategy for addressing sex segregation, my analysis of 61 interviews with industry engineers suggests that increasing women's disproportionate representation in managerial roles in engineering may promote the very sex segregation it is attempting to mitigate. The analysis highlights how organizations reinforce female engineers' movement into managerial roles and foster a form of intraoccupational sex segregation with unintended consequences for women. These consequences include fostering mixed identification with engineering, reinforcing stereotypes about women's suitability for technical work, and increasing work–life balance tensions. The findings further suggest that an inverted role hierarchy in engineering may explain these gendered career patterns and their unintended consequences. By inverted role hierarchy I mean the valuing of technical over managerial roles. Implications for the literatures on occupational sex segregation, women's representation in managerial roles, and the experience of women in male-dominated occupations are discussed.

Supplemental Material: The online appendix is available at <https://doi.org/10.1287/orsc.2017.1132>.

Keywords: female engineers • gendered career paths • intraoccupational sex segregation • inverted role hierarchy

Introduction

Occupational segregation refers to the division and hierarchy of labor based on workers' demographic characteristics (Acker 1998, Ashcraft 2013, Bergmann 1974, Charles and Grusky 2004, England 1982, McCall 2001, Reskin 1993, Tilcsik et al. 2015). Sex segregation is a specific form of occupational segregation that refers to men's and women's concentration in different occupations, with highly segregated jobs considered "sex-typed" (Gross 1968). While researchers and policy makers alike have devoted significant attention to understanding the causes and consequences of occupational sex segregation, much of the focus has been on uncovering strategies to improve women's representation in male-dominated occupations (Reskin 1993, Williams 1992). Underlying this focus is the view that sex segregation represents a significant barrier to women's equality and advancement in the workplace (Ashcraft 2013, Reskin and Roos 1990). This is the case because sex segregation forms the basis for differential access to resources, as male-typed jobs tend to receive higher pay and are considered higher status (Treiman and Hartmann 1981).

One of the most highly and persistently sex segregated occupations in the United States is engineering

(Bix 2014, Cech 2013a, Cech et al. 2011, Fox 2006). Women continue to opt out of, and be underrepresented in, engineering fields even as they increase their presence across a wide range of other traditionally male-dominated fields. In fact, women represent only about 15% of the overall engineering workforce, and as little as 8% of the workforce in some engineering subdisciplines, such as mechanical engineering (NSF 2015). Scholars and policy analysts explain these statistics by referring to problems with female engineers' entire "career pipeline," noting challenges related to recruiting women to study engineering (Eccles 1994, 2007), moving women from school into engineering careers (Frome et al. 2006), and keeping women in engineering (Hewlett et al. 2008). Even if women do enter the engineering profession, they are significantly more likely to leave the profession compared to their male counterparts (Hewlett et al. 2008).

One commonly posed remedy for addressing occupational sex segregation—in engineering as well as other male-dominated occupations—is increasing women's numeric representation in management roles (e.g., Cohen and Huffman 2007, Gorman 2005, Skaggs et al. 2012, Stainback and Kwon 2012). This recommendation, and the research that informs it, is based on the

premise that increasing women's visibility and power in male-dominated occupations will reduce the persistent gender stereotyping, discrimination, and perceptions of lack of belongingness and fit that pose barriers to women's representation (Gaucher et al. 2011, Heilman and Parks-Stamm 2007, Skaggs et al. 2012). In line with this recommendation, engineering firms, as well as firms in other male-dominated fields such as investment banking and construction, have made genuine effort to promote women into leadership roles (Gale and Cartwright 1995, Jacobs 1992, Shenhav 1992). Indeed, research shows that female engineers are now in managerial roles in numbers disproportionate to their overall representation in engineering firms (Fouad et al. 2012).

While the literature suggests that women's increased access to management positions in male-dominated occupations should represent an important strategy for addressing persistent sex segregation, my analysis of interviews with industry engineers revealed that moving women into managerial roles in engineering firms may foster a form of intraoccupational segregation that has unintended, and mostly negative, consequences for female engineers. The analysis presented highlights how organizations reinforce women's movement into managerial roles and illustrates identity and professional consequences for female engineers in the form of fostering mixed identification with engineering, reinforcing stereotypes about women's suitability for technical work, and posing work-life balance tensions. Furthermore, the findings suggest that an inverted role hierarchy in engineering appears to explain both women's positioning in managerial roles and the potential consequences to women of such positioning. By inverted role hierarchy, I mean a context in which technical roles are considered to be more valued than managerial ones. Taken together, the findings shed light on how and possibly why occupational sex segregation persists despite women's increased representation in managerial and leadership roles in engineering firms.

The theory of intraoccupational sex segregation developed through this research builds and extends literature on occupational sex segregation, women's numeric representation in managerial roles, and the experience of women in male-dominated occupations, such as engineering. First, this research demonstrates how women and men in a highly sex segregated professions may get further segregated into different career paths—a form of intraoccupational sex segregation. This finding is significant given that, with few exceptions (see Hinze's 1999 research on the formation of gendered symbolism around medical specialties and William's 1992, 1995 work on the "glass escalator"—how men in female-typed work get a boost into managerial and leadership positions because of

their high status as men), much of the extant research on occupational segregation has focused on *interoccupational* rather than *intraoccupational* sex segregation. The present research highlights instead how women and men get segregated into different roles in certain male-dominated occupations and illustrates the role that organizations play in fostering this segregation. In making this contribution to the sex segregation literature, this study adds to research on "glass ceiling" and "glass escalator" phenomena. While previous research would predict that women in a male-dominated profession would experience a "glass ceiling" instead of a glass escalator due to men's higher status position (Cotter et al. 2001), the current research suggests instead that women appear to be riding a glass escalator into managerial roles in engineering firms, but that unlike the men's escalator (Williams 1992), this one appears to have hidden, potentially negative consequences for women. The findings highlight how the meaning of managerial roles, and hence perceptions of whether one's gender is perceived as congruent with these roles (Eagly and Karau 2002), may be context specific.

Second, this study also adds to existing research on women's representation in managerial roles (see Skaggs et al. 2012 for a review; see also Maume 1999). The present study suggests that increasing women's representation in managerial roles in engineering may be associated with unintended consequences for women not predicted by prior research. The findings highlight that a practice that appears beneficial to women on its face may actually also foster a form of intraoccupational sex segregation with unintended identity and professional consequences for women. Though previous research has suggested that management roles improve women's retention in male-dominated work contexts because of factors such as increased access to status, power, and decision making, and increased perceptions of inclusion and fit (Kanter 1977, Skaggs 2008, Stainback and Kwon 2012), the findings presented here show how moving women into management roles in certain contexts may have the effects of reducing women's identification with the focal profession, validating pervasive gender stereotypes and fostering work-life balance tensions—factors that may ultimately make the pipeline for female engineers more tenuous.

The theory I develop here uses the lens of role congruity theory to reconcile the variability in men's and women's experiences of the glass escalator in sex-typed occupations. Role congruity is perceived when a stereotype about a role occupant aligns with the attributes thought to be required for success in a role (Eagly and Karau 2002; see also Eagly et al. 1992, 2000). While role congruity theory has been used to explain why women in managerial roles experience prejudice

due to inconsistencies between female gender stereotypes (e.g., warm, caring) and typical leadership characteristics (e.g., aggressive, decisive; Eagly and Karau 2002, Ritter and Yoder 2004), this study shows how role congruity perceptions connected with managerial positions are context specific. In particular, the present study reveals what I refer to as an inverted role hierarchy in engineering firms, whereby (high-status) technical roles are perceived as “male” and (lower-status) managerial roles are perceived as “feminine,” and thus more suitable for women.

Typical of a grounded theory approach, the bulk of the theorizing is tied to the findings. However, to orient the reader to the eventual findings, I provide a brief review of the relevant literature on occupational sex segregation and some of the strategies that have been posed to address it. The review clarifies how and why recommendations for increasing women’s numeric representation in managerial positions in male-dominated occupations may be inadequate for understanding how and possibly why moving female engineers into managerial roles in engineering firms may weaken rather than strengthen their career pipeline by promoting intraoccupational sex segregation.

Theoretical Review

Occupational Sex Segregation

As noted, occupational sex segregation refers to the division and hierarchy of labor based on gender (Ashcraft 2013, Charles and Grusky 2004, Gross 1968, McCall 2001). Results stemming from decades of research have offered numerous explanations for the persistence of sex segregation between occupations (for a review, see Reskin 1993). Theories of occupational segregation focus on both sides of the labor market—the demand side and the supply side. Demand-side explanations suggest that employers explicitly or implicitly signal and evaluate candidates’ fit with certain jobs and roles, as well as show preferences for certain types of workers (Reskin 1993, Reskin and Hartmann 1986). Examples of demand-side explanations include discriminatory and biased practices in hiring and promotion, factors that signal workers’ potential access to an occupation (e.g., the sex makeup of the workplace; Bix 2014, Cotter et al. 2001, Eagly and Karau 2002, Joshi 2014, Reskin and Hartmann 1986, Heilman 2012) and exclusionary and biased professional and organizational cultures (Cech 2013a, Robinson and McIlwee 1991). Supply-side explanations suggest that individuals sort themselves into certain occupations based on factors such as their own preferences, needs, dispositions, self-expressive decision making, and human capital (Arrow et al. 2000, Cech 2013b, Cech and Blair-Loy 2014). For example, women may be more likely to select teaching over

engineering because of sex differences in interests or gender role beliefs (Cech 2013b, Eccles 1994, Su et al. 2009), or more likely to abandon ambitions in male-typed occupations because of expectations for family care or low confidence in their ability to meet the expected competencies, roles, and identity characteristics of the occupation (Cech et al. 2011, Correll and Benard 2006, Eccles 1987, Fiorentine 1987). Specific to engineering, research suggests that the perception of engineering as “gender inauthentic” for women (Faulkner 2000, p. 169; see also Bix 2014) fosters feelings of role incongruence that reduce women’s perceptions of fit with the engineering role (Cech et al. 2011). Thus, supply-side explanations suggest that women’s preference for, and persistence in, male-dominated occupations emerges out of voluntary individual motivations and preferences, rather than structural or institutional factors (Correll 2001).

In addition to offering these demand- and supply-side explanations, scholars have also suggested that occupational socialization processes influence who can and should “become” a member of a specific occupational group (Anteby et al. 2016). Researchers have described how a social order emerges in some occupations whereby these occupations come to appear more suited for certain people (e.g., men) and unlikely for others (e.g., women; Ashcraft 2013, Bailyn 1993, Rivera 2012). These types of “cultural narratives” equate some occupations with “male” and reinforce a cycle of segregation.

Scholars and policy makers interested in addressing issues of occupational sex segregation have recommended several strategies to foster greater equality and gender integration. These solutions, like the explanations that inform them, have largely centered on demand- and supply-side strategies. Demand-side strategies include putting in place policies and practices designed to reduce gender discrimination and bias in educational settings, foster more inclusive workplace cultures, make workplaces more family friendly (e.g., by providing flexible work arrangements), and reduce discrimination and bias in employment decisions (Dobbin 2009, Richman et al. 2011, Ridgeway 2009, Ridgeway and Erickson 2000). Supply-side strategies include efforts to address women’s biased assessments of their own skills, to help women improve their professional confidence and access to social networks, and to increase women’s interest in male-typed occupations through programs (e.g., MakerGirl) targeted at precollege girls (Cech 2013b; Cech et al. 2011; Eccles 1994, 2007; McDonald et al. 2004).

One dominant approach—advocated by scholars and policy makers alike—to address both supply-side and demand-side contributors to occupational sex segregation is to increase women’s representation in management roles in male-dominated contexts (Skaggs

et al. 2012). Because of their perceived high status, managerial roles have traditionally been more accessible to and perceived as more suitable for men, even in occupations that are dominated by women (Heilman 2012, Eagly and Karau 2002, Williams 1992). Thus, increasing women's visible representation in these roles is thought to break down stereotypes and barriers for women. From the demand side, research shows that women's representation in visible, leadership roles can have a positive effect in terms of reducing bias in recruitment, hiring, and promotion, and improving the perceived supportiveness of organizational cultures (Cohen and Huffman 2007, Gorman 2005, Stainback and Kwon 2012). These benefits accrue as a result of women's increased access to decision-making roles, mentoring, and social networks (Skaggs et al. 2012), and as a result of reduced prevalence of gender stereotyping (Ely 1994, 1995; Gorman and Kmec 2009). Furthermore, as women occupy more managerial roles, they create prospects for increased "homosocial reproduction" (i.e., hiring socially and demographically similar others; Kanter 1977, Rivera 2012), as well as more opportunities for the women below them (Maume 2004, Nelson and Bridges 1999). From the supply side, these factors translate into traditionally male-typed occupations being seen as more attractive, friendly, and accessible to women, thereby increasing their interest and motivation to pursue them (Beasley and Fischer 2012, Richman et al. 2011).

To date, arguments for increasing women's representation in leadership roles have largely been applied to advocacy for increasing women's representation in middle and top management positions in organizations as a strategy for shattering the "glass ceiling" (Cotter et al. 2001, Skaggs et al. 2012, Stainback and Tomaskovic-Devey 2012). However, improving women's numeric representation in managerial roles in male-typed occupations has also been advocated using similar logic (Ely 1995, Huffman et al. 2010, Stainback and Kwon 2012). Increasing women's leadership and visibility in male-dominated occupations is thought to open doors for women by reducing stereotypes about women's suitability for these occupations and strengthening the role of women as leaders and mentors in these occupations (Ashcraft et al. 2012, Czarniawski and Sevón 2008, Kanter 1977, Tracy and Rivera 2010). One mechanism through which increasing women's representation in managerial roles is thought to benefit women is by increasing perceptions of role congruence (Eagly and Karau 2002). Tying this evidence to the research on occupational segregation, one would predict that women's greater representation in visible leadership positions, combined with organizational efforts to promote diversity by attracting women into these positions, should both address the glass ceiling problem—by reducing stereotypes about

women's suitability for managerial roles—and give women access to the same escalator advantages as men.

Overall, prior research suggests that sex segregation persists in numerous occupations and that a dominant strategy advocated for reducing sex segregation has been increasing the numeric representation of women in managerial positions. This research takes as a starting point that because managerial roles are the "high-status" position, they are often considered the purview of men even in female-dominated professions. This review surfaces an important, and as yet underexamined, broad question relevant to the current research: *How and why might occupational sex segregation persist in a male-dominated occupation despite increased women in managerial roles?* While previous research has suggested that in male-dominated occupations moving women into managerial roles may help to address sex segregation, when is this not the case?

With this research, I seek to answer this question and, in doing so, to build and extend theory pertaining to occupational sex segregation, women's managerial representation, and the experience of women in male-dominated occupations, such as engineering.

Method

Research Contexts and Data

The fact that engineering is one of the most sex segregated occupations in the United States makes it a useful context for studying sex segregation and the experience of women in male-dominated occupations (Cech 2013a, Cech et al. 2011). Engineering represents an "extreme case" as a strongly male-dominated occupation (Fox 2006, NSF 2015), thereby increasing the potential for the phenomena of interest to be more easily observed in this occupational context (Eisenhardt 1989). Moreover, as noted, there is evidence to suggest that women are represented in managerial roles in engineering disproportionate to their numbers. A research report funded by the National Science Foundation showed that approximately 50% of women in engineering are in a managerial career path, and roughly 75% of women who left engineering less than five years ago were in a managerial path (Fouad et al. 2012). This makes engineering a suitable context for observing gendered career patterns and their potential consequences.

The interview sample comprised a total of 61 engineers (35 female, 26 male). Participants were solicited through an email to alumni of an undergraduate engineering program located in the midwestern United States and through emails to members of a professional engineering association and honor society. Of those contacted to participate, 65% agreed to do so. No significant differences on key attributes were noted between those who participated and the nonrespondents. Participating engineers represented a total of 25

Table 1. Informant Characteristics

Female informants					Male informants				
Participant	Prof. tenure	Org. tenure	Subdiscipline	Career path	Participant	Prof. tenure	Org. tenure	Subdiscipline	Career path
W1	7	7	General	Managerial	M1	35	35	Software	Technical
W2	16	1	Computer	Reentry ^a	M2	30	25	Agricultural	Managerial
W3	1.25	1.25	Mechanical	Managerial	M3	18	8	Electrical	Technical
W4	9	9	Software	Managerial	M4	35	35	Mechanical	Managerial
W5	32	8	Chemical	Exit ^a	M5	12	12	Electrical	Technical
W6	1	1	Electrical	Managerial	M6	8	8	Process	Technical
W7	8	8	Mechanical	Managerial	M7	18	18	Electrical	Technical
W8	5	5	Mechanical	Managerial	M8	18	18	Electrical	Technical
W9	2	2	Mechanical	Managerial	M9	2	2	Mechanical	Technical
W10	13	13	Mechanical	Technical	M10	4	6	Electrical	Technical
W11	1.5	1.5	Mechanical	Managerial	M11	2	2	Mechanical	Managerial
W12	6.5	6.5	Mechanical	Managerial	M12	26	26	Mechanical	Technical
W13	9	7.5	Software	Managerial	M13	5	5	Nuclear	Technical
W14	28	2	Chemical	Managerial	M14	10	10	Civil	Technical
W15	1	1	Electrical	Managerial	M15	19	5	Mechanical	Technical
W16	9.5	9.5	Aerospace	Managerial	M16	10	10	Computer	Technical
W17	4	4	General	Managerial	M17	18	8	Materials	Technical
W18	8	3	Computer	Technical	M18	20	20	Electrical	Technical
W19	8.5	8.5	Aerospace	Managerial	M19	13	1	Software	Technical
W20	4	0.5	Civil	Technical	M20	7	1	Electrical	Exit ^a
W21	4	1.4	Civil	Managerial	M21	9	1.5	Computer	Technical
W22	22	10	Electrical	Managerial	M22	1	1	Software	Managerial
W23	5	5	Mechanical	Managerial	M23	3	3	Mechanical	Managerial
W24	12	12	Mechanical	Managerial	M24	30	20	Electrical	Managerial
W25	15	4	Computer	Managerial	M25	1	1	Software	Managerial
W26	7	2	Software	Managerial	M26	2.5	1	Software	Technical
W27	11	1	Electrical	Reentry ^a					
W28	10	1	Software	Managerial					
W29	13	7.5	Mechanical	Technical					
W30	10	1	Software	Technical					
W31	33	7	Mechanical	Managerial					
W32	1	2	Chemical	Managerial					
W33	18	5.5	Systems	Technical					
W34	2	2	Mechanical	Managerial					
W35	8	2	Software	Technical					

^a“Exit” indicates informants who left industry for other roles (teaching and real estate). “Reentry” indicates informants who left the workplace to care for children and have reentered. Both are excluded from calculations of informants in technical and managerial paths due to nontraditional career pathing.

unique organizations and 13 engineering disciplines (aerospace, agricultural, chemical, civil, computer, electrical, general, materials, mechanical, nuclear, process, software, and systems). Roughly even numbers of men and women were represented in each of the industries included in the sample. The average professional tenure was 9.9 years for female informants and 12.7 years for male informants. Overwhelmingly, women in the sample described having taken, or planning to take, a managerial career path, while men described having taken, or planning to take, a technical career path. See Table 1 for a summary of informant characteristics.

Data Collection. The data source was semistructured interviews of all participating engineers (Marshall and Rossman 1999). Of the 61 engineers, 59 were interviewed via telephone, and 2 were interviewed face

to face. No restrictions were placed on engineer or industry type. Interviews lasted one hour on average and were recorded and transcribed verbatim. I collected the interview data in two rounds to be able to iterate between data collection and analysis (Strauss and Corbin 1998). For example, in Round 1, I noticed that informants talked about “managers being viewed as less technically proficient” and “managers noticing women for their people skills,” and thus revised the interview protocol for subsequent data collection rounds to determine whether these were critical themes. After completing the second round of data collection, I reanalyzed the full data set. To more easily make gendered comparisons, I staggered the gender order for the interviews. Data were collected over a 12-month period. Thirty-one interviews were completed in Round 1, and 30 interviews were completed in Round 2.

As noted, the interview protocol was modified during the study period to include additional questioning about emerging themes (Spradley 1979); however, a common set of questions was asked of all participants (see Online Appendix A). For example, all informants were asked to talk about their work and work history, interests and approaches to work, career trajectory, experiences at work with male/female engineers, satisfactions and dissatisfactions with work, and thoughts about their future career plans. A common set of questions facilitated comparison across informants, and asking new questions allowed me to explore the importance of emerging themes.

Data Analysis. I analyzed the interview data using a grounded theory approach. Consistent with this method, I analyzed the data in an iterative pattern, linking the data to the emerging theoretical framework and vice versa (Strauss and Corbin 1998). The analysis comprised three main steps. The first step began with “open coding”—i.e., reviewing the transcripts and identifying descriptive codes tied directly to the words of informants. Through open coding, the data were broken into discrete incidents, ideas, events, or acts and given a name or “code.” Examples of open codes include, “I was told I could benefit the organization from the people side” and “females are better at project management.” Open coding, as well as other forms of coding, took place within and across the two rounds of data collection.

Open codes were bundled into more abstract groupings in the second step of axial coding (Locke 2001). Examples included “diversity promotion initiatives” and “gendered task assigning.” The third step involved exploring the relationship between the more abstracted codes into a theory that best summarized how the data fit together as well as how they fit with existing organizational theory. Having delineated this theory, I again reexamined the data to ensure fit with my emerging theoretical understanding (Locke 2001). Though I refer to my analytic process as comprised of “steps,” the process was not strictly sequential. Instead, it was a dynamic, iterative analysis that involved traveling back and forth between data and theory (Strauss and Corbin 1998). Table 2 summarizes the data structure resulting from the analytic process, depicting the theoretical categories as well as the associated labels and descriptions.

Findings

The findings highlight that organizations appeared to reinforce gendered career patterns—women’s movement into managerial roles—and suggest significant (mostly negative) unintended identity and professional consequences of gendered career patterns for female engineers. Additionally, the data highlight that an inverted role hierarchy—which favors the status of technical over managerial roles—may explain both the movement of women into the managerial career path and the associated consequences for women.

Table 2. Overview of Data Structure

Theoretical categories	Labels	Descriptions
Gendered career patterns	Technical vs. managerial	Women were in managerial roles disproportionate to their numbers in engineering firms.
Organizational reinforcement of gendered career patterns	Explicit organizational gender sorting	Organizations were interested in promoting women into management to signal diversity and inclusion.
	Implicit organizational gender sorting	This involved the practice of teams or project groups assigning female engineers coordination and organizing tasks, and the practice of noticing certain skills and capabilities in women, and using this information to consider women more suited for managerial roles.
Identity and professional consequences of gendered career patterns	Enhanced role fit	Managerial career paths provided women with access to opportunities for improved perceptions that they were a good “fit” with their work role.
	Mixed professional identification with engineering	Women taking the managerial path did not strongly identify with being an engineer and/or felt less like “real engineers.”
	Validation of stereotypes about female engineers	Having women in managerial positions reinforced gender stereotypes about female engineers’ technical proficiency and about women being dispositionally suited for managerial roles.
Inverted role hierarchy in engineering	Work-life balance tensions	Individuals on the managerial path worked longer hours and had less flexibility about where and when to perform their work.
	Technical roles as more valued	Technical roles were more revered, especially by male engineers.
	Managerial roles as peripheral	Managerial roles were seen as “peripheral” or “settling,” and that they were considered “easier” by engineers in technical roles.

Consistent with prior research (Hesketh et al. 1992, Johnson and Sargeant 1998, Sedge 1985, Tremblay et al. 2002), informants described two dominant career paths available to engineers. One was a “technical/individual contributor” path (hereafter, the “technical path”). The other was a “managerial” path. On the technical path, engineers “become technically adept in a few vertical areas” (W17).¹ As virtually all engineers described: “In my company, there is an engineering career—a technical career we call it—and a managerial career we call it” (M8). On the managerial path, engineers could choose roles focused on the “business side” (e.g., strategy, budgets, planning), or they could do project or product management where they “supervised and coordinated groups of technical experts” (W17). Informants described the careers paths in the following way:

There are certainly positions within the company that are more technically focused. We need people like structural analysts or thermal analysts or ballistic experts. Those are very technical roles where you start at low level analysts and work your way up. That is a pretty direct technical course. But there are certainly options as well to go into a more managerial position with a broader scope like myself. (W16)

Again, consistent with prior evidence (Fouad et al. 2012), overwhelmingly, women in the sample described having taken, or planning to take, the “managerial path” while men described having taken, or planning to take, the “technical path.” Additionally both men and women noted this general trend in their organizations—that women were less likely to take the technical path. The following quotes illustrate this point:

I see very few women veer towards the technical side. (W3)

I actually have a lot [of women] in the management role, but very few go into what you consider as a technical, the technical expertise... very few have gone in those directions. (M15)

I’ve had more product managers be women than men. I’ve had more business analysts be women than men. The more managerial positions have all tended to be more women than men in every company I’ve been in. (W30)

Moreover, as I elaborate in more detail below, both male and female engineers saw women as more uniformly suited for managerial roles, while there was more variation in men’s perceived suitability and interests for these positions. The following quote illustrates this point:

There’s definitely a good portion [of men] that are in the really engineering group... again I don’t know how to say this... the really analytical type/mindset... and then there’s definitely some [men] that fall in the general

[managerial] mindset... it does seem like there’s a distribution of them... versus women, the women tend to be more generalists, soft skills, that type of thing. (W19)

To summarize, the data support prior evidence of gendered career patterns in engineering firms and suggest that these patterns were widely observed among informants. As I describe in the next section, the data also suggest that organizations appeared to play a role in moving women toward the managerial career path.

Organizational Reinforcement of Gendered Career Paths

The data revealed two ways that organizations reinforced women’s movement into managerial roles. I refer to these as *explicit organizational gender sorting* and *implicit organizational gender sorting* mechanisms. Explicit organizational gender sorting refers to organizations’ overt efforts to move women in managerial roles to promote diversity. Implicit organizational gender sorting, by contrast, is associated with prevalent but unstated managerial actions, such as assigning women gendered tasks and encouraging women toward managerial roles because they are seen as a good fit with women’s skills and abilities. See Table 3 for additional illustrations of these practices.

Explicit Organizational Gender Sorting. Not surprisingly given the numeric underrepresentation of female engineers in engineering firms, and consistent with recommendations for addressing occupational segregation by putting more women into managerial roles (Skaggs et al. 2012), many informants reported that their organizations had strong diversity promotion initiatives directed at promoting more women into management roles. See the following quote for example:

There certainly is a strong push in the industry, though, to move [women] into management roles because especially in an engineering field, past history what it is, very few managers in engineering roles... I don’t want you to think I’m opposed to it, I’m far from it, I think it’s great. Between two candidates, women may have the edge because they [the organization] need to increase diversity in the ranks. (M12)

Consistent with the research presented in the introduction to this paper, these diversity promotion efforts were aimed at making the organization appear more desirable to new female hires and improving female engineers’ access to mentors and sponsors. The following quote exemplifies this point:

Recently we have been promoting more women to be engineering managers so that when a woman starts with the company she might work for an engineering manager or she might say, “hey these are the women who are managers within my engineering organization, they’ve

Table 3. Organizational Reinforcement of Gendered Career Paths: Additional Illustrations

Theme	Illustration
Explicit organizational gender sorting	<p>"I know there are certain advantages in my career path that I will get because I am a woman . . . you come across it more in the managerial path because that's where that typically gets noticed. . . . It looks good when there are more minorities or women in charge, looks better for diversity . . . looks better for the company in general" (W21).</p> <p>"In the engineering world, there are a lot fewer women than men. At our company we want a diversified portfolio, you can say we're taking affirmative action. If you have a woman engineer, it's very desirable to have them in positions of power because you can say 'hey, we're breaking the curve.' Especially in mechanical and electrical engineering, 1 in 10 are women, [so] to have a woman as a vice president, executive, or director, in managerial power, its more for the company as an image than a guy. Everyone's seen an old white dude, but the company gets to say 'hey this is a woman, [in] a position of power.' In terms of image . . . we're breaking the mold, we have women in places of power" (M23).</p>
Implicit organizational gender sorting	<p>"I feel like in meetings, women are thought of as being better at communicating and so they frequently are put in the role of taking notes, but I think that's just based on stereotyping and not actually based on real world evidence" (W30).</p> <p>"[In a project meeting, with] two junior people, one of them will be assigned to take notes and that one is a woman" (W33).</p> <p>"I've noticed that more women are interested in the social aspect of our work than men" (M19).</p> <p>"I would say predominately the organization is selecting the people. Because that's how it works. Almost always, especially earlier in a person's career, you're getting tasked, and the organization says you're going to be the one to lead that initiative" (W14).</p> <p>"I would make the generality at least comparing myself to other technical people is that one of my strengths is knowing how to communicate and to present information in a way that's easily mobile and that's something that has really led to my success and that's why I get tasked a lot and I think a lot of people who are technical get into the details too much and that's just something that's just lost at a higher level of communication so they don't get tasked as frequently because it's not as easy for people to absorb the information and be part of the decision making and move on" (W17).</p>

been promoted and given this position and I look up to them and might ask them questions about my career goals." (W25)

Informants indicated that diversity promotion was likely to connect women with the managerial path. The following quote illustrates this:

There's always so much focus on how to get women into leadership—how do we get more women? How do we find the women that will do that role? Even in my work I've noticed that with me being a manager, [we always ask], how do we get more women? How do you recommend we get more women in management? I would imagine if that's what I'm hearing, at least for the younger girls that are well qualified, they are also being pursued. (W24)

In short, many informants provided evidence that their organizations had diversity promotion initiatives that helped reinforce women's movement into the managerial career path.

Implicit Organizational Gender Sorting. Organizations also appeared to reinforce gendered career paths in a more implicit way by assigning women gendered tasks in project teams and encouraging women to take on roles that emphasized the "people side" of engineering. To begin, informants described clear gender differences in how engineers were tasked in project groups. Female engineers—especially junior women—were often assigned tasks that set them up to take on

less technical and more "coordinator" functions in the future as the following quotes illustrate:

Work is getting assigned out, we're talking about who is going to do the helpful coordinator part so okay Patty will do it. . . . I think a lot of it has to do with opportunity in the sense that that is what is presented to you . . . you'll get assigned it next time too. (W33)

They had her [referring to a female colleague] assigned to nontechnical things, arranging things, putting things together, and representing the team in team meetings. She did very well at that, and I'd have to say being there, she brings strong communication skills to the table. And as a result, they kind of want to put her in a position full time because she's done so well. (M25)

As a result of being regularly assigned coordination tasks, women were not always given access to the same technical opportunities on project teams as their male counterparts:

This stereotype of guys are [technical] doers, if you get a woman who's into engineering, maybe [she's] not given that opportunity to work in that environment. . . . They're not used to [it]. That leads to more management-type roles [for women]. (W18)

Additionally, informants described what appeared to be managers' predilection to pay attention to certain skills and behaviors in women, and to justify the encouragement of women toward managerial positions based on these observed skills and behaviors.

Several female informants described how they had been noticed by superiors for their strong “people” or “soft” skills:

[My manager told me] “I have confidence that you could do the technical side, but I’m confident you’d benefit the company from the people side.” . . . He told me when he hired me that, based on my resume, based on my interview that I was extroverted. . . . I’m okay with talking with people which is probably different from most engineers [laugh]. (W3)

This perception that women had skills and abilities that made them more suited to managerial roles appeared to drive their placement into these roles. Indeed, informants noted that organizations actively played a role in tracking engineers toward certain roles:

I think it’s the leadership that’s leading the people [into roles]. Managers I’ve worked for directly, I can’t say that I know the actions, but I know the results have been that the male engineers are groomed for the technical specialists and the female engineers are groomed for the more the management role. . . . The leadership has guided the female engineers more into the management role where the male engineers have been guided in the technical specialist roles. (M15)

Female informants noted that being noticed for their people skills had given them access to higher-level managerial positions in their organizations:

It’s not like I consciously do it, but I think that my ability to read people in a meeting and my ability to know when somebody’s confused, some people might not have as a soft skill. It’s actually given me an advantage when it comes to meeting with managers or customers, or people who really make the calls in the company. Because of that, I’ve seen my career accelerate a lot faster than other people around me. (W19)

The analysis also suggested that some women who were perceived to have skills congruent with management may have been encouraged to go into managerial roles even when these roles were not the best fit with their personal interests. One woman talked about how her organization had been having recent discussions about making sure the company is not pushing women toward management if it is not for them:

Certainly within our engineering organization we’ve kind of discussed *Lean In* and that not all women want to manage. We shouldn’t be forcing them to do something they don’t want to do. (W25)

Another informant talked about her personal experience with being encouraged by her mentors to go into management because of her people and communication skills, not because of her interests. She realized later it was not what she wanted to do:

I recently had a one year stint in the managerial path. It was something my management and our portfolio

managers really pushed for because they felt I had skills—I am articulate, good with people, have excellent presentation skills—that would really allow me to succeed. I hated it, switched back to a technical path, and disappointed most of my champions. Now I’m thankful that I know myself better not to do it again. But how many women do you think will push back against their well-intentioned management? (W33)

These forms of organizational reinforcement for women’s movement into managerial roles were referenced by a large majority of informants, and women and men were equally likely to reference these themes. See Table 4.

To summarize this section, the data highlight two ways that organizations reinforced women’s movement into managerial roles—what I refer to as explicit organizational gender sorting and implicit organizational gender sorting mechanisms. Diversity promotion at the organization level made the priority of placing women in managerial roles salient and attractive to organizational leaders. Additionally, it appeared that, from the early stages of their careers, women were given chances to practice and hone their managerial skills, skills that would later be noticed by managers and used to groom women for managerial roles. Being seen by their supervisors as being comparatively skilled and suited for managerial roles appeared to reinforce women’s movement toward this career path. In the next section, I highlight some unintended consequences of these gendered career patterns. As the data suggest, gendered career patterns appeared to have consequences for female engineers’ identities and their experience of the profession.

Unintended Identity and Professional Consequences Associated with Gendered Career Paths

Though some of the consequences of gendered career patterns in engineering firms appeared to be positive for female engineers, taking the managerial path appeared to also have consequences that could create challenges for women. From an identity point of view, and on the positive side, many women reported that taking the managerial path allowed them to experience perceptions of *enhanced role fit*—the sense that they enjoyed and were well suited for their work role (Eagly et al. 1992, Lyness and Heilman 2006, Pazy and Oron 2001). However, on the negative side, women on the managerial path described feeling *mixed identification with engineering*—that is, they did not consider themselves, or feel that they were considered by others, as “real engineers.” In terms of professional consequences, the data suggest that gendered career patterns were associated with professional challenges for women in the form of *validating stereotypes about female engineers* and *work-life balance tensions*. Each of

Table 4. Frequency of Referenced Themes in the Data

Theme	Frequency of referenced themes		
	Female (N = 35)	Male (N = 26)	All (N = 61)
Organizational reinforcement (explicit and implicit gender sorting) Chi-square = 0.67, $p = 0.41$	71% (25)	73% (19)	72% (44)
	Female (N = 32)	Male (N = 25)	All (N = 57)
Perceived role fit			
Technical role (N = 25)			
Low–moderate	29% (2)	28% (5)	28% (7)
Strong	71% (5)	72% (13)	72% (18)
Managerial role (N = 32)			
Low–moderate	28% (7)	100% (7)	44% (14)
Strong	72% (18)	0	56% (18)
Chi-square (all groups) = 14.81, $p < 0.05$; chi-square (male and female managerial only) = 11.52, $p < 0.05$			
	Female (N = 32)	Male (N = 25)	All (N = 57)
Identification with engineering			
Technical role (N = 25)			
Low–moderate	0	17% (3)	12% (3)
Strong	100% (7)	83% (15)	88% (22)
Managerial role (N = 32)			
Low–moderate	88% (22)	14% (1)	72% (23)
Strong	12% (3)	86% (6)	28% (9)
Chi-square (all groups) = 32.83, $p < 0.01$; chi-square (male and female managerial only) = 14.70, $p < 0.01$			
	Female (N = 35)	Male (N = 26)	All (N = 61)
Work–life balance tensions associated with managerial role Chi-square = 0.01, $p = 0.91$	51% (18)	50% (13)	51% (31)
	Female (N = 32)	Male (N = 25)	All (N = 57)
Stated intention to leave engineering			
Technical role (N = 25)	0 (0/7)	11% (2/18)	8% (2)
Managerial role (N = 32)	44% (11/25)	0 (0/7)	34% (11)
Chi-square = 11.91, $p < 0.01$			

Note. Summary percentages are provided to illustrate level of support for main themes; however, these summaries require caveats: (a) Levels of role fit and identification with engineering were not measured quantitatively, but rather extrapolated from informant comments. (b) Percentages may be underrepresentative, as not all engineers were asked the same questions or chose to elaborate on the same themes. (c) Frequency counts represent the presence (1) or absence (0) of themes in any given interview. Sample sizes differ across themes as some themes (e.g., perceived role fit and stated intention to leave engineering) do not apply to engineers who have exited or recently reentered the profession.

these themes from the data is illustrated in more detail below. See Table 5 for additional illustrations of these identity and professional consequences.

Identity Consequences: Enhanced Role Fit and Mixed Identification with Engineering. *Enhanced role fit.* Enhanced role fit refers to the descriptions of women on the managerial path of finding a path in engineering that suited them: “Managerial program management fits me much better” (W7) and “I think I was able to find a career path or job that is suited for my personality” (W21). Several female engineers talked about

being happier in engineering and more confident since moving into managerial roles:

The weird thing is, I think it’s [my career satisfaction] probably gotten stronger over time even though my work has gotten less relevant to engineering over time. Just this year, I graduated with an MBA because most of my work now is managerial, administrative, strategy related...so less pure engineering....So in essence, I think it’s actually getting stronger. (W19)

If I stayed in a technical track and was really focused on structural analysis, I’m sure at many times I’d feel like “I am not cut out for this”...I think it’s a matter of finding out what you are cut out for....That’s why

Table 5. Identity and Professional Consequences of Gendered Career Paths: Additional Illustrations

Theme	Illustration
Enhanced role fit	<p>"[Had I not taken the managerial path] I probably would have dropped out of engineering. Because if you get that my interests are not traditional and they're not textbook thermodynamics, there's no way I could not do a role like that. This is more of an untraditional engineering career path and it's fun. And it's very technical. It's outside the box. It's creative. It's kind of a combination. . . . The balance between having the technical expertise and the business understanding, puts me in unique place in engineering and the technical community. . . . I'm a happy woman" (W8).</p> <p>"I don't think most people get the opportunity to do what I've done, I think a lot try hard, but I think there are a lot of people who want to do it, but don't have the right formula, it sounds arrogant when I don't mean it to be, but a lot of times its right, prime right place to, for example, I've wanted to do this role for a long time . . . I can be successful and get all of my personality fun-ness in there, so it's very rewarding for me in that sense" (W22).</p>
Mixed identification with engineering	<p>"When I think about who I am and what I like to do, my work doesn't always come up. . . . Like if someone says, 'Tell me about yourself,' you know, I'd be like well, I like to read. I like football. I work at [Company Name]" (W04).</p> <p>"A lot of people define themselves as engineers. I wouldn't say that I particularly love being an engineer or would define myself by that" (W03).</p> <p>"I walk around like a toddler to all these different people, I realize how much I don't know, but I can never fill their shoes. And in that sense, I'm not an engineer on that level anymore" (W22).</p> <p>"I'm not more of the quote, unquote, traditional engineer in my particular job. I would say the skills from engineering I heavily leverage are problem solving in ambiguous situations" (W17).</p>
Validation of gender stereotypes	<p>"There are some aspects of management and housekeeping and that's sounding biased . . . but I think a woman doesn't mind covering those tasks. . . . I could definitely believe that there are some aspects that stereotypically a man might not want to expense himself towards. For whatever it's worth, that's what I think" (W33).</p> <p>"I've been called a mom before. . . . but I think that, I have a young daughter and I tend to approach things the same way . . . 'how are you doing? Are you getting your work done?' Maybe a little more nurturing. . . . It doesn't bother me, it's not a bad stereotype to have, everybody loves their mom. . . . I don't know how that ever got there" (W24).</p> <p>"Women engineers are a little more empathetic . . . a lot of them display the traits to be a good manager, they care about their people, they care about how they communicate, how they develop products" (M23).</p>
Work-life balance tensions	<p>"My manager. . . was double and triple booked on meetings for most of the week and all the usual paper work and technical responsibilities on top of that. It looked to me like a 60-75 hour week and I was not willing to do that" (M17).</p> <p>"I have two small children myself who are four and eighteen months and I'm now looking at competing for supervisory position although I still have hope to have another child which makes me a little concerned about what that means for my balance to be a manager" (W12).</p>

I moved into more project and program management type work and now operations, and now I'm feeling like "Yeah, turns out I do know what I'm doing, and I'm pretty damn good at it." (W16)

Several informants noted that, had they stayed in technical roles, they might not have stayed in the profession:

I'd thought about going outside of engineering to look for a more dynamic job, a dynamic workplace, maybe a job where I'm not literally sitting at my desk for eight hours straight, a job with more interaction with people, more on the social side. . . . Now that I've finally been patient long enough, to stay in this field long enough to get a little bit ahead, and see where this is heading, I have been pulled into discussions on asset management, and I have sort of seen that your job can be whatever you want it to be, and if I want it to be more social, I can make that happen. (W20)

Women in managerial roles described how one reason that they experienced greater perceived fit with managerial roles is that they were less likely to have to

prove themselves or be challenged about their technical knowledge. See the following quote for an example:

I think that as I have started to develop and use some of these leadership/technical skills as I learn them, I felt like others started to perceive me as an engineering leader and I really haven't had to prove myself as much in this role. I feel like it just naturally fits. (W24)

In contrast to women's experience of role fit in managerial roles, men in managerial roles often described more ambivalence about having moved away from a strictly technical role as the following quote shows:

I'm probably better as an individual contributor. . . . [As a manager] I get frustrated when the people I work with, or work under me, try something that's shotty, not high quality. It's frustrating . . . I want to go back to being closer to the manufacturing environment with decisions to be made that are more closely related to technical stuff. (M23)

Moreover, many male managers talked about the managerial path not in terms of role fit, but rather in terms

of an opportunity for advancement that they saw as inevitable as they progressed in their careers:

I think in my general nature is to always advance... that seemed like the natural progression path to get into management... I don't have any reservations, but I believe I would've been equally happy if I had not taken the managerial path. I would've been a very successful individual contributor. (M24)

I think [it was] a gradual evolution. I was still interested in technology, the technical things, and also I was paying more attention to the other aspects that go along with being a manager... As you take on more roles in a technology area, you still have to keep the business side of it in mind... That helped move me towards a managerial type role. (M2)

In an additional contrast to the descriptions of role fit provided by women in managerial roles, women in technical roles expressed more ambivalence about fit:

I don't know if it was my most natural career choice, I do find it difficult and challenging to think in terms of being an engineer and designer all day long. Personally, I think that I have to work at being an engineer. (W18)

Women on the technical path also talked about having to repeatedly prove their competence and expressed that the managerial path might be easier in terms of not having to do that as much:

It just feels like you are better accepted in a managerial position than as an individual contributor. You don't always have to be proving yourself... I feel like if you're a manager you're telling people what to do so there's less opportunity for someone to challenge you. And you don't have to be in a position where you're putting forth your opinion or information about these complicated details so no one is going to challenge you on that. It feels like it just makes things easier. (W30)

As shown in Table 4, most female engineers in managerial roles could be characterized as perceiving strong role fit. This contrasts with the mostly male engineers in managerial roles whose narratives suggest low perceived fit with managerial roles. These patterns suggest that although being in managerial roles appeared beneficial for female engineers' perceptions of role fit, this did not appear to be the case with male engineers. As illustrated in the next section, though female engineers on the managerial path may have felt enhanced role fit, being in this role also appeared to weaken their identification with the engineering profession and being an engineer.

Mixed identification with engineering. Another identity consequence of gendered career patterns was that women on the managerial path reported mixed identification with engineering. Many described how they did not closely identify with being an engineer:

I don't super closely identify with being an engineer at work. I know I have a technical job, but I'm not in the nitty-gritty at work. (W17)

I don't do as much fundamental engineering anymore on a day-to-day basis. In that sense, if I were to professionally identify myself, it would be as a manager, not an engineer. (W19)

Women on the managerial path also talked about how some of their engineering colleagues joked that they were not "real" engineers anymore: "There's one guy who rubs me wrong. He's always pulling that... he'll say, 'she's not a real engineer'" (W22).

In contrast, many women on the technical path described a stronger engineer identity; for example "Engineering is very central to my personality" (W33) and "It's a very large part of my identity" (W10). In further contrast to women on the managerial path, men on the managerial path did not describe low levels of identification with engineering associated with their transition to management:

When I tell people what I do, I tell them I'm an engineer. I don't tell them I'm a manager. I've been a manager essentially for eight years, but I still refer to myself as an engineer... I like the technical aspects of it... I talk with the people that report up to me a lot about the technology, the things that are in their projects... "have you thought about this, thought about this, thought about something else." (M2)

As shown in Table 4, a majority of female engineers in managerial roles but no female engineers in technical roles could be characterized as having low levels of identification with engineering. This contrasts with the almost all male engineers—in both managerial and technical roles—who described strong identification with engineering.

To summarize, though enhanced role fit suggests potentially positive identity consequences for women on the managerial path, the reduced identification with engineering suggests possible negative consequences for women's attachment to the profession. Moreover, both implications appeared to be absent for many men in managerial roles, as well as all women in technical roles. As is shown in the next section, the analysis revealed two professional consequences associated with women's movement into managerial roles.

Professional Consequences: Validation of Stereotypes and Work–Life Balance Tensions. *Validation of stereotypes about female engineers.* The data also suggested that gendered career patterns may have served to validate the already pervasive stereotypes about female engineers being less technically competent than male engineers. Research has established that women in engineering are widely stereotyped, by both men and other women, to be less technically proficient than their male counterparts (Bix 2014, Jagacinski 1987, Richman et al. 2011). My findings suggest that having more women in managerial roles may have the consequence

of serving to validate this stereotype. Informants—especially male informants—provided evidence that management positions were often viewed as a stronger fit for those that were less technically competent:

The product manager hardly touches any code, they will have more business insight, what are the needs to the business, what are the different solutions to that, and the product manager would prioritize different solutions and eventually pick one [that] engineering would implement. (M22)

The farther you get into management, the less you might be exposed to new technologies because the team you're managing is like "hey, we should use new technology to solve the problem" and you're like "great, that sounds awesome, I trust you to have evaluated the software and determined that it is the correct path to go down" and you might become only vaguely aware of what the new technology is. (W30)

Other informants provided evidence that, although all engineers on the managerial path were viewed by other engineers as less technically proficient, women were especially likely to be viewed this way; for example, "I feel female managers are very likely perceived as less technical than male managers" (M21) or "I think if I was completely honest, I'd judge her [a female manager] a little more harshly [than a male manager] on her technical" (M25). As one informant described, technical engineers often assumed she was less proficient:

A lot of the technical engineers, I'll end up rubbing them the wrong way by asking them questions... and when they treat me like I'm not smart enough to get the answer, that's hard on me. (W22)

Even female engineers on the technical path showed open disdain for the technical ability of female managers: "You're in meetings with these people [female managers] and they ask completely dumb questions" (W29). Others took a more measured tone, describing managerial positions as being associated with less need to continually prove technical competence:

If you're a manager, there's less of a burden to prove your [technical] competence... all you have to do as a manager is be capable of explaining what needs to be done to someone who is technically proficient. I'm not saying that a bad manager can't do horrible things, but [in] the worst case scenario all you need that manager to do is hook you up with the right resource. You don't have to worry about is this woman I'm working with technically proficient? That doesn't matter, she's just your interface to a resource that you need. (W33)

Women in managerial roles also expressed their own feelings that they lacked the "technical depth" of their engineering counterparts, thus contributing to a sense that they had less technical proficiency, and that engineering came more "naturally" to men. The following quotes illustrate this point:

It's hard to admit sometimes in the software world that I did not end up with the technical depth in a particular

programming language that many of my counterparts would have. So I can code and do everything I need to do fine but I'm not—I hesitate to call myself an expert. (W13)

It just seems like things come really natural to them [men] a lot of the time. I don't know if they're just really good at pretending like it comes naturally. I don't know, but it just seems like it's more their thing. (W1)

In addition to viewing those in managerial roles as less technically proficient, informants—especially men—made reference to female managers in stereotypically feminine terms, such as viewing them as "parental" or dispositionally "caring":

What's the word I'm looking for? Subconsciously it's associated with a parenting type role, so I don't know maybe I'm completely misguided in that regard, that's what comes to mind. It feels like, I don't know, it's difficult, I know my manager puts in a lot of time as well, I don't know why I made that association, it's probably purely subconscious from there... I feel like a manager is a leader, they have to be able to talk to people about their strengths and weaknesses, able to propose ideas and do course corrections when things don't go right, and it often feels like that's what parents do when you're growing up, maybe that's subconscious correlation there, but maybe that's where I'm getting it from. (M21)

Women do better at managerial roles, they don't do better, but... a lot of them display the traits to be a good manager, they care about their people, they care about how they communicate, how they develop products... If you have 10 engineers in a room, from our company, they're all going to be smart, but it's the one who can communicate well, the one that can get people behind them... they're stereotypically female. And I think that's why we see sort of the difference [in career path]... everybody's very smart, [but] who has those other qualities, and those other qualities tend to be feminine. (M23)

By contrast, men on the managerial path appeared to be judged less harshly "on their technical" and were not described in stereotypically feminine terms. Several informants spoke about the "credibility" of being in a managerial role: "I can't think of the word for it but there's this value that's there, credibility and relationship points" (M4). Others described their own male managers in technically favorable terms:

My current manager has done a lot of technical stuff, throughout his life, and he's had a lot of technical experience... [he has] a lot of, I guess you can call it, wisdom about it... like a lot of experiences gained through all his technical experience. (M25)

Taken together, these perceptions, held by men and women, validated the pervasive stereotype of women

being less technically proficient and being dispositionally suited for less technically oriented and more “feminine” roles.

Work-life balance tensions. A second professional consequence of being on the managerial path, suggestive of negative implications for female engineers, was that managerial positions were described as being associated with more work hours and less flexibility, thus creating greater work-life balance tensions to occupants of these managerial roles.² See the following quote for example:

The hours are more flexible for technical than for managers... [in the managerial role] you're pretty much expected to be available 24/7... working on the weekends, you're on call at all times. Individual contributors might have couple weeks where you have a project and it must be pretty rigorous, but most of the time you can use the normal hours. (W18)

Male and female engineers noted that the hours required often make it more difficult to maintain work-life balance on the managerial path:

The manager track would be harder to maintain the work life balance. The technical track is easier unless you get really up to the top. (M10)

[On the managerial path] They expect a lot of hours out of you. It's not uncommon to have to work a 50, 60 hour week, and that can be very difficult. ... So it creates a lot of challenges. That's what I've seen. (M6)

Direct references to work-life tensions associated with managerial roles were made by approximately half of the engineers in the sample, across both male and female respondents (see Table 4). These patterns suggest that female and male engineers were equally likely to reference work-life tensions associated with the managerial role.

To summarize this section, gendered career patterns appeared to have several unintended identity and professional consequences for female engineers. Women on the managerial path described experiencing heightened perceptions of role fit in managerial roles; however, they also described mixed levels of identification with engineering. Gendered career patterns also had professional consequences in engineering in the form of validating stereotypes about female engineers and fostering work-life balance tensions associated with longer work hours and less work flexibility. In the next section, I describe themes from the data that help to explain both women's movement into managerial roles and the validation of gender stereotypes and mixed professional identification associated with women's movement into these roles.

An Inverted Role Hierarchy

The findings point to an inverted role hierarchy in engineering—i.e., the valuing of technical over managerial roles—that appeared to explain why managerial roles were associated with validation of stereotypes about female engineers and the mixed identification with the engineering profession experienced by women in these roles.

For quite some time, researchers have noted the “technical/social dualism” in engineering (Faulkner 2000, p. 761)—i.e., “the ideological separation of technical and social engineering competencies” (Cech 2013a, p. 1148). They have also noted that this dualism is infused with gender stereotypic distinctions between masculine instrumentality and feminine expressiveness, with the “technical work” of engineering being defined as masculine (e.g., Bailyn 1987, Bix 2014, Male et al. 2009) and the “social work” of engineering being seen as more feminine and more invisible (Fletcher 1999). This research provides the backdrop for the findings reported here.

In an environment where technical skill is revered (Robinson and McIlwee 1991), members of the dominant group—male—attached more value to the technical career path and less to the managerial path:

I think the specialists are really more revered in all instances. (M3)

So the very talented people who have the highest status, I think there's a lot of respect for the people in the technical path and a lot of people aspire to that. ... There's a term that we use, call people lab jockeys, yeah they're very talented and good at what they do. [They're] good at lab work, but they're not really interested in making any progression beyond there ... there's people who do that are very respected here. (M9)

While the technical specialist role was revered, many—especially men—described the managerial role as undesirable, often expressing open disdain for the managerial career path: “I don't like to be called a manager” (M8) or “Maybe they get rewards out of it, but I don't see how I could do that” (M7). Others—especially men—described managerial roles in terms of “settling” or being at “the periphery” of technical work:

I feel that a lot of the tasks that women fall into, gravitate to, whatever ... stuff that isn't necessarily sexy I guess, as to some of their peers may not want to work on, where they have to work on several different projects at the same time. I think that's the kind of work and that's the strength where they ... settle to. Not that they're settling, but they gravitate to that sort of thing. Or it gravitates to them perhaps. (M3)

Because the technical role was considered the higher-status or more valued role, women who deviated from this role experienced the double jeopardy of being

women and being seen as less able to “cut it” in technical roles, thus lending validation the long-held stereotypes that women are less suited for engineering work (see Bix 2014).

Second, an inverted role hierarchy appeared to reinforce mixed identification with engineering for women in managerial roles. Because of perceptions that technical work was the “real” work of engineering, as described previously, female engineers occupying managerial roles questioned their own status as “real engineers” as well as whether their skills were considered valuable in engineering. Many talked about how the “soft skills” required for managerial positions represented the “nonglorious side” of engineering or were simply not as recognized as being important:

I end up in kind of like the project management role of just making sure all of the pieces are there so we can actually do our work. It’s from a technical side, but it’s often the nonglorious side. (W13)

It seems like these things, these skills, these traits that I’ve honed for a very long time...one might label as soft skills maybe...are not really the kinds of things that get rewarded as much on day to day. Or are being recognized. (W15)

Indeed, women in managerial roles talked about how their roles “looked easy” to technical people, or about technical people not respecting what they did:

Nobody really knew how much work was done. It’s sort of like the duck, you can see the head and the feet are paddling like crazy. Nobody could really see the paddling we were doing underneath, but it needed to be done and it was done really well...we just managed it in a way that it looked easy. And we kept the difficult parts to ourselves...and then I think the other side of it is, in typical female fashion, I didn’t promote the fact that we had done all of that. (W14)

Taken together, these findings suggest that an inverted role hierarchy in engineering placed high value on technical roles and lower value on managerial roles. In this context, having women in managerial roles was associated with validation of pervasive stereotypes about female engineers’ technical proficiency and their self-perception of not being and being seen as “real engineers.”

Discussion

The findings from this research illustrate the organizational reinforcers and unintended consequences of women’s movement into managerial career paths in engineering firms. Organizational practices—what I have labeled explicit and implicit organizational gender sorting mechanisms—seemed to reinforce women’s movement into managerial versus technical

roles and appeared to have significant, negative identity and professional consequences for female engineers. Though being in managerial roles looked to be associated with female engineers’ greater perceptions of role fit, it was also associated with mixed professional identification with engineering and the validation of negative gender stereotypes about female engineers. Additionally, the data suggest that the managerial role may foster work–life balance tensions. Finally, the data highlight an inverted role hierarchy in engineering that may explain the negative unintended consequences for female engineers.

Theoretical Contributions

Together, the findings from this study make contributions to the literatures on occupational sex segregation, women’s numeric representation in managerial roles, and the experience of women in male-dominated occupations, such as engineering. More specifically, the findings reveal intraoccupational sex segregation in engineering firms. While previous research on occupational sex segregation has focused on the reasons for, and the nature and implications of, gender segregation between professions (see Reskin 1993), this research instead highlights how and possibly why sex segregation occurs *within* the profession of engineering. The findings suggest that women and men become segregated in engineering by taking distinctly different career paths and that this segregation has consequences for female engineers that may ultimately foster greater sex segregation in engineering by decreasing women’s identification with the engineering profession, promoting gender stereotypes about female engineers, and fostering work–life balance tensions. Thus, the findings are suggestive that a practice that appears positive—promoting women into managerial roles in engineering—may have unintended consequences that may contribute to engineering remaining sex segregated even when women do enter the profession. Moreover, this research highlights an inverted role hierarchy in engineering—whereby technical roles are considered the most valuable and high status—as an explanation for why gendered career patterns in engineering firms may have hidden disadvantages for women.

Contribution to the Literature on Occupational Segregation

These findings pertaining to the prevalence and unintended consequences of intraoccupational segregation in engineering extend recent work by Ashcraft (2013) and Ashcraft et al. (2012) on the “glass slipper” effect, i.e., how occupations come to appear possessed of characteristics that make them appear suitable for certain people and not for others. The current study illustrates an intraoccupational version of the glass slipper

effect by highlighting how managerial roles in engineering are seen as more suitable and plausible for women, and that having more women in managerial roles may further perpetuate their lower status. Based on this glass slipper effect, Ashcraft and her colleagues have taken issue with arguments for fostering women's greater representation in male-typed occupations (Ashcraft 2013, Ashcraft et al. 2012). They suggest that traditional solutions to sex segregation may be hampered by the fact that "inclusivity" and "exclusivity" are interdependent, such that women can be both present in male-dominated occupations and also denied full access in important ways. Echoing this notion, the gendered career patterns and fostering of intraoccupational sex segregation found here provide some illustration that moving women into managerial roles fosters both their inclusion (through enhanced access to leadership roles and perceptions of role fit) and their exclusion (through lower identification with engineering and validation of persistent gender stereotypes).

Second, these findings highlight how organizations may contribute to intraoccupational sex segregation through practices that explicitly and implicitly move women into managerial roles. More explicitly, this research shows that organizations wishing to promote gender diversity see women as attractive candidates for managerial roles and appear to be pushing women toward these roles in part to satisfy diversity agendas—what I refer to here as explicit organizational gender sorting. This finding is consistent with what has been demonstrated by Dobbin (2009)—that human resource practices designed to foster equal opportunity in organizations may favor women's movement into managerial roles. However, my study also shows that, more implicitly, organizations promoting diversity foster a gendered distribution of task assignments that sets women up to develop and be noticed for their "people skills" and proficiency in "organizing," and subsequently, to be groomed for managerial roles. I refer to this as implicit organizational gender sorting in engineering firms. This finding extends recent work by Chan and Anteby (2016) that shows that gendered task assigning can result in women doing less desirable tasks compared to men. While these authors focus on task differentiation as a form of intraoccupational gender inequality, the present study shows that such task differentiation may also foster downstream role differentiation—in the form of gendered career paths—that results in intraoccupational sex segregation.

Third, the findings reported here add to previous research that suggests that moving women into managerial and leadership roles should help to diminish occupational sex segregation (Ely 1994, Cohen and Huffman 2007, Gorman 2005, Skaggs et al. 2012,

Stainback and Kwon 2012). The current research shows that moving women into managerial roles in engineering may also contribute to occupational sex segregation in some instances, particularly when the occupation is characterized by an inverted role hierarchy. The findings suggest that this is the case because it may lower women's attachment to the focal profession, validate persistent gender stereotypes, and foster work-life balance tensions that may make women's retention in these roles less tenable.

Contribution to the Literature on Managerial Diversity

The findings also extend research on the effect of affirmative action programs designed to move women into managerial roles. While some research suggests that these efforts may backfire by undermining the confidence of those benefited—either because they personally feel they do not deserve to be there or because critical others question whether they deserve to be there (Chacko 1982; Heilman et al. 1992, 1996, 1987)—the findings reported here suggest that actions to move female engineers into managerial roles may not similarly backfire, in part due to an inverted role hierarchy that reinforces the perceived role congruence of managerial roles for women in engineering. This adds to existing research on the effect of affirmative action programs in organizations (Dobbin 2009, Dobbin et al. 1993) by highlighting an unsettling conclusion that people—both beneficiaries and observers—may react less negatively to affirmative actions in organizations when the beneficiaries are assigned to roles that do not challenge the existing status hierarchy.

Second, this study adds new insight to extant research on the "glass ceiling" and "glass escalator" effects. Previous research has established that women experience a glass ceiling preventing them from accessing managerial and leadership positions in organizations due to prejudice stemming from women's perceived incongruence with these roles (Eagly and Karau 2002, Eagly et al. 2000, Heilman 2012). Based on this past research, one might also expect women to lack access to managerial roles in engineering. Research on the "glass escalator"—which suggests that men in female-dominated occupations rise to managerial and leadership positions disproportionately because of their higher-status position in society (Williams 1992, 1995)—would also predict that women should have less access to managerial roles in male-dominated contexts because of their lower, minority status. In contrast, the current research suggests that women appear to be riding a glass escalator into managerial roles in engineering firms. However, unlike that experienced for men in female-typed occupations, this glass escalator can have unintended, negative consequences for women. Furthermore, while it is tempting to interpret

these findings to suggest that women may avoid the glass ceiling in engineering, it is important to note that, although female engineers appear to be in managerial roles disproportionate to their numbers in engineering firms, they still lack access to top leadership positions in engineering firms (e.g., Shenhav 1992). Thus, it appears that female engineers may experience the double penalty of both a false glass escalator and a glass ceiling in engineering firms.

Third, the findings suggest that one reason for these unexpected consequences may be that the meaning of managerial roles, and hence whether one's gender is perceived as congruent with these roles, is shaped by the context and the role hierarchy of an occupation—in this case, an inverted role hierarchy. This research provides insight into how and why the ways in which perceptions of occupant congruity or “fit” for certain types of organizational roles (i.e., management) may become gendered based on context. Previous research has shown that because management positions are more likely to be perceived as “masculine,” women are often perceived as less suitable for management roles (Koenig et al. 2011, Ely 1995). Traditionally, masculine traits such as aggressiveness, dominance, and decisiveness are often linked to management positions, making people more likely to think “male” when they think “management” (Heilman 2012). The current research provides a contrast to these previous findings by suggesting that in engineering—where technical roles are considered to be the more masculine roles, and thus most valued in the dominant male culture (Bix 2014, Lemons and Parzinger 2007)—managerial roles appear to be considered more suitable for those with “soft” or “people” skills. In engineering firms, management roles are perceived by both men and women as more stereotypically feminine, and thus more suitable to women. This flipping of the script on perceptions of the characteristics needed for success in management provides further evidence for the social construction of women's and men's perceived suitability for certain roles in occupations and organizations (see also Turco's 2010 findings that the effect of tokenism depends on cultural context).

Contributions to the Literature on Gendering of Work

This research makes theoretical contributions to the ongoing discussion about how to improve the career pipeline for women in engineering. The bulk of the research on female engineers' retention focuses on how to reduce barriers to entry and retention by increasing women's proportional representation, addressing workplace culture problems, and making workplaces more family friendly (Singh et al. 2013). While extant studies have advocated diversity promotion as a strategy for addressing these barriers, the current study

suggests that simply bringing more women into engineering may not be enough to reduce persistent sex segregation if segregation is perpetuated even after women enter the profession. This study suggests that while providing women with access to managerial roles may be an important strategy for signaling inclusion, and increasing women's perceptions of role fit, it may also reduce their identification with engineering and validate the same types of gender stereotypes and foster the same types of family-unfriendly work conditions that are known to foster attrition risk. Indeed, as shown in Table 4, almost half of managerial female engineers in the study sample stated an intention to leave engineering at some point in the future. This finding is in line with recent research showing that low professional identification with engineering is associated with women's intention to leave engineering (Cardador and Hill 2016). Moreover, evidence from a national longitudinal study funded by the National Science Foundation showed that over 70% of women who leave engineering move to managerial roles in other—and importantly—not necessarily engineering, firms (Fouad et al. 2012). Taken together, this evidence suggests that if the goal is to keep women in the engineering field, promoting them to managerial positions may undermine this outcome.

With respect to women's perceptions of role fit associated with managerial roles, the findings reported here add to the literature on person–job fit (e.g., Edwards 1991, Lauver and Kristof-Brown 2001). Particularly because much of this research finds that fit is beneficial to critical outcomes such as job satisfaction and commitment (Kristof-Brown et al. 2005), some may question the problem with female engineers' being drawn to jobs that provide more opportunity for enhanced perceptions of fit through the expression of “social” and “organizing” interests. In addition to failing to acknowledge that in some contexts—as seen here—fit may represent a double-edged sword for role occupants, this line of reasoning overlooks an even larger issue, that is, that the desire for fit may not only move people toward certain roles, but actively away from others. For example, it may be the case that the masculine nature of many technical cultures is driving women away from technical roles instead of toward managerial roles. Accordingly, future research should consider how and when technical jobs could also be made to foster greater fit for women.

Taken together, the findings from this research may shed additional light on why women's severe underrepresentation in engineering remains a perplexing and tenacious problem. The findings suggest that even when women surpass significant barriers to enter the profession, the intraoccupational segregation highlighted here may overturn, in part, the potential gains associated with entry by reinforcing the very same barriers that women seek to overcome.

Practical Implications

The findings from this research carry several practical implications. First, they suggest that moving women into managerial roles may help to improve their perceptions of role fit. As noted, this suggests a potential benefit to organizations, especially if perceptions of fit are associated with greater career satisfaction, and thus enhanced retention. However, the findings also suggest that there may also be significant downside to this strategy, such that it may result in women identifying themselves as more managerial rather than technical, and thus enacting what is considered for this environment to be the more “feminine” role. Though women who excel in managerial roles are in the unique position of being both technically *and* managerially competent, when roles become differentiated, it may have the unintended consequence of validating the stereotypical notion that female engineers are less suited for the technical roles, which are both prototypically masculine and idealized in this context. When technically competent female engineers move into sex-typed occupational roles, they may suffer the ill effects of even more gender stereotyping associated with following a “female path” in a “male occupation.”

Second, the findings with respect to organizational reinforcement of gendered career patterns suggest that engineering firms may need to be more conscious of how women and men are mentored into their respective tasks, roles, and career paths. While seeing women—either because of the reality or the stereotype—as more “extroverted,” “good with people,” or “organized” may be an effective basis for assigning tasks and/or placing women in managerial positions, organizations should also be cautioned to check that they are not fostering the development of these skills in women against their interest or based on gendered stereotypes of women’s capabilities and skills. If they do, they may be unwittingly restricting women’s access to technical roles and possibly creating the very retention problems they are trying to avoid.

Third, this research presents a cautionary tale for organizations launching diversity initiatives to increase the recruitment and retention of female engineers. The findings suggest that moving women into managerial roles may have unintended consequences that could foster the potential for greater risk of attrition. Risk of attrition refers to attitudes associated with an intention to leave one’s job or profession (Blau and Lunz 1998, Doering and Rhodes 1989). Though, as noted, perceptions of enhanced role fit in managerial roles may increase women’s sense of satisfaction with their work and thus their retention (Fouad et al. 2012), low professional identification, exposure to gender stereotyping, and work–life balance tensions have all been clearly linked to attrition risk—particularly for

women—inside and outside of the engineering profession (Beasley and Fischer 2012, Chen and Moons 2015, Eagly et al. 1992, Fouad et al. 2012, Gaucher et al. 2011, Greenhaus and Beutell 1985, White et al. 2003). If women’s representation in managerial roles creates attrition risks for women, the practice of promoting women into managerial roles may ultimately undermine, rather than improve, the retention of women in the engineering profession.

Related to the previous implication is the final, and perhaps most important, practical implication of this research. Many studies of women in male-dominated organizations and occupations have suggested that improving female representation is the single most important factor for improving conditions for women in male-dominated work contexts (Kanter 1977, Konrad and Gutek 1987). While this is without a doubt an important goal, the current research suggests a more daunting task ahead. The findings suggest that getting women into technical roles may not be enough to keep them there. If women are disproportionately groomed for and represented in managerial roles in engineering instead of technical roles, new women entering the profession will still face a lack of female technical role models. Thus, another potential problem with significant numbers of female engineers in managerial roles is that even if women enter and remain in the profession, the gender stereotypes, masculine culture, and differential treatment of women in technical roles may continue to persist, thus perpetuating the tenacious sex segregation in the engineering profession.

Limitations and Future Research

This study has limitations that suggest opportunities for future research. First, the study has limitations inherent to an inductive methodology (e.g., threats to external validity). However, through naturalistic generalization—reasoned judgments about appropriate comparisons from one case to another context (Kvale 1996)—tentative comparisons to other potential contexts can be drawn. My focus on engineers suggests that the findings may generalize to other male-dominated occupations and organizations where the work is gender-typed “male,” and thus managerial positions may be perceived as more feminine (e.g., finance or fire-fighting). For example, women in the U.S. military may be moved from more masculine combat roles into “safer” administrative managerial roles. Additionally, the identification of an inverted role hierarchy as an explanatory factor suggests that the unintended consequences of moving women into the managerial career path may also generalize to other segregated occupational contexts where the managerial role is less valued. For example, in academia, a female professor may be called upon to take a managerial role (program director or associate dean) and in the

process might be devalued by her peers and/or face different consequences than her male counterparts. In line with these issues, this study opens new avenues for examining the extent and impact of gendered career patterns in other occupations.

Second, the findings that gendered career paths exist in engineering and that they seem linked to identity and professional consequences for women are necessarily associational rather than causal. While the theory depicts an ordering of findings based on narrative causality (Polkinghorne 1988), it is unclear whether having more women in managerial roles fosters perceptions of role fit and lowered identification, or whether women's perceptions of fit with managerial roles and lower identification with engineering drive them toward managerial roles. While the words of informants suggest the sequencing presented, future research is needed to explore these issues of causality and further examine how these processes unfold.

Third, work-life balance tensions associated with the managerial role were perceptual, not observed. As a result, evidence for managerial roles creating barriers for women in this regard are inferred from the words of informants. Therefore, future research is needed to further examine the link between management roles in engineering firms and work-life balance tensions, as well as to establish potential gender differences associated with this relationship.

Finally, while the findings honed in on forms of organizational reinforcement as a contributing factor to gendered career patterns in engineering firms, it is also possible that personal and motivational factors underlie women's decisions to move into such roles (e.g., Cech 2013b). In light of this possibility, it may be that women are in managerial roles because they fit with their interests. It may also be that women are not simply moving toward managerial roles in engineering firms, but also actively moving *away* from purely technical roles in response to differences in interests or perceptions that others hold negative expectations about their technical propensity. Future research following women's career development in engineering over time is needed to tease apart the influence of personal and organizational factors in contributing to gendered career patterns in engineering.

Conclusion

An oft told joke among engineers is that engineers don't think the glass is half empty or half full; engineers think the glass needs to be redesigned. In this vein, the key findings of this study—that gendered career paths are prevalent in engineering, that organizations foster them, and that they may have unintended negative consequences for female engineers explained by an inverted role hierarchy in engineering firms—provide

insight that “redesigning” the career paths of engineers may have important consequences for female engineers' career pipeline.

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Endnotes

¹ W refers to a female informant; M refers to a male informant.

² Though work-life balance tensions associated with the managerial career path may apply to all workers, they may be more problematic for women given evidence of women's greater responsibility for childcare (Hochschild and Machung 2012) and that work-family balance tensions have been cited as a major reason why women leave engineering (Fouad et al. 2012, Hewlett et al. 2008).

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