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The Effects of Race and Gender on Income and Workplace Position of Professional
Engineers in Ontario: Can Homophily Preferences Help Explain Barriers?

by

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requirements for the degree of
Master of Arts

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ABSTRACT

Canada has an extensive history of anti-discrimination legislation to reduce inequality for minority groups, yet, they continue to experience disadvantage. Recent literature has suggested that barriers for minority groups into and within work persists in part because of subtle processes like homophily as individuals develop a preference for similar others. Studies of professions are important because previous studies suggest homophily preferences along dimensions of race and gender are high within professions, contributing to widening inequalities. Engineering provides an excellent case for analysis of homophily within professions, since Statistics Canada data suggests that engineering is among the most common professions for visible minority men in Canada. It is also a profession, wherein few women are employed, and research has identified barriers and discrimination limiting the opportunities of minorities. Homophily preferences and discriminatory workplace practices might be the source of these barriers, reproducing social inequalities. Using the Canadian Workers in the Knowledge Economy Engineering Survey and parallel in-depth interviews, this study employs an explanatory mixed-methods design to explore the role of homophily in reproducing inequalities within engineering. Greater understanding of labour market inequality and how it operates can inform the implementation of more effective policies, in order to reduce labour market inequality.

Keywords: engineering, inequality, Ontario, labour markets, homophily

INTRODUCTION

Canada has an extensive history of anti-discrimination legislation to reduce inequality for minority groups, yet, they continue to experience disadvantage. Recent literature has suggested that barriers for minority groups into and within work persist in part because of subtle processes like homophily as individuals develop a preference for similar others. Studies of professions are important because previous studies suggest homophily preferences along dimensions of race and gender are high within professions, contributing to widening inequalities (Dickerson 2008; Kanter 1977; Rivera 2012; Roth 2004). Engineering provides an excellent case for analysis of homophily within professions, since Statistics Canada data suggests that engineering is among the most common professions for visible minority men in Canada (Statistics Canada 2016). It is also a profession, wherein few women are employed, and research has identified barriers and discrimination limiting the opportunities of minorities. Homophily preferences and discriminatory workplace practices might be the source of these barriers, reproducing social inequalities. Using the Canadian Workers in the Knowledge Economy Engineering Survey and parallel in-depth interviews, this study employs an explanatory mixed-methods design to explore the role of homophily in reproducing inequalities within engineering. Greater understanding of labour market inequality and how it operates can inform the implementation of more effective policies, in order to reduce labour market inequality.

This paper highlights existing gender and racial barriers in engineering that can negatively impact opportunities and outcomes leading to differences in income, limits to promotion and in some cases, underemployment. For both women and visible minorities, there is evidence of barriers related to both monetary and non-monetary rewards. Women earn less than men and are more likely to believe that they do not receive equal credit for their contributions and skills compared to their male counterparts. Visible minorities also earn less, but the barriers extend

beyond income differences. Visible minorities are more likely to be over-qualified, forced into lower level positions where they express the desire for more autonomy and authority. This paper uses the concept of homophily as a lens to better conceptualize how discriminatory practices can manifest themselves in new, subtle ways and the processes that may be underlying these practices. In the case of women, homophily preferences are widespread and often come in the form of exclusion from daily work interactions as males prefer to interact with male colleagues for reasons of comfort, and detrimental inferences surrounding the knowledge that women bring to work organizations. Exclusions of these sorts could be particularly detrimental in engineering because of the nature of engineering to be dynamic – constantly changing – which makes it difficult to effectively keep up to date with current codes without increased collaboration with colleagues. Homophily preferences based on race might come in the form of soft skills required in achieving upward mobility. Soft skills are increasingly important in progressing successfully within engineering. Though, the kind of cultural capital and soft skills required to excel in engineering in Canada likely disadvantages visible minority foreign trained engineers. For many, English is not their first language which can lead to barriers in promotion based on race / ethnicity. This paper contributes to our understanding of workplace processes reproducing racial and gender inequalities within Canadian professions.

LITERATURE REVIEW

Ineffectiveness of Anti-discrimination Legislation

Despite antidiscrimination legislation, women and visible minorities continue to experience marginalization in the Canadian labour market. This marginalization includes unemployment, underemployment and underrepresentation in professional and managerial positions (Atkins 2006). Previous research suggests that minority groups' disadvantage in income, hiring and promotion can in part be explained by discriminatory workplace practices and other more covert

processes like homophily. One profession where barriers for minority groups remain particularly high in Canada is engineering. Attention to inequalities within professions like engineering is important since many employment studies have focused exclusively on low-wage or low-skill labour markets. Inequality is driven by privilege as well as disadvantage (Rivera 2012). Therefore, inaccessibility for certain groups into and within professions is contributing to widening gaps between the rich and the poor.

Gender Barriers in Engineering

Problematizing Gender Stereotyping: Assumptions about Knowledge of Women Engineers

Gender stereotyping is normalized and can particularly disadvantage women in male dominated fields like engineering. I would argue that many men in engineering carry stereotypes and pre-conceptions about the kinds of cultural capital that women in their classes and workplaces bring to various projects. In other words, many males carry beliefs about what women know and can positively contribute to the classroom and workplace. Socialization encourages men to believe that women lack important cultural capital required for work in engineering. Often, this manifests in overt or tacit beliefs that women bring less valued knowledge and skills. In university, which is often the site of initial exposure to engineering, teamwork activities are common (Seron et al. 2015). Teamwork activities form the bulk of projects in university and in these activities, women are often relegated to secretarial activities of organizing and scheduling while males did the intensive knowledge work requiring greater responsibility, skills and ability. This included men running models, experimenting with various designs and searching for efficient solutions to complex problems (Seron et al. 2015). Thus, it is not just the case that women in engineering are assigned to completely different activities than men, but these activities are hierarchized with secretarial activities within engineering carrying less value and cultural rewards. Blau (1974) argues that divvying people along nominal parameters, that is

subgroups with distinct boundaries, is not detrimental on its own. However, this process can become detrimental when nominal parameters become highly correlated to graduated parameters, wherein individuals are then placed in ranked orders. In this particular instance, gender becomes highly correlated with preconceived capital and knowledge to the disadvantage of women. Consequently, similar to Blau, I would argue that the consequences for women in professions dominated by men are low rates of inter-group association, low social mobility and barriers towards social integration (Seidman 2017). Feminist scholars contend that men have used different arenas such as science, medicine and popular culture to push a discourse that nature dictates gender differences and that hierarchies are justified and beneficial. In this way, I would argue that practices salient in teamwork activities are one way that this occurs as this process reinforces male social dominance and plays a role in defining women's self-realization in terms of traditionally feminine work roles, or as their roles as wives or mothers (Seidman 2017).

Racial Barriers in Engineering

Visible Minority Immigrants Face Greater Disadvantages in Securing Employment Related to Experience, Education and Language Barriers

Both locally trained and foreign trained visible minorities experience greater barriers into and within engineering than non-racialized individuals (George and Chaze 2014). George et al. (2011) contend that for visible minorities in engineering, many job search strategies have been ineffective in acquiring suitable work due to their inability to offset barriers. One major barrier for visible minority immigrants is their lack of a Canadian network. Research finds that managers prefer hiring individuals referred to them by colleagues or other employers for reasons of efficiency as doing so can often save costs and time associated with interviewing, in addition to already being screened as an effective employee by another employer (Fountain 2005). This is an unsurprising finding and largely supports previous literature which highlights

the benefits of social capital in finding jobs (Granovetter 1973), especially in cases of immigrant settlement (George and Chaze 2009). Thus, immigrants can be particularly disadvantaged in finding employment because of low social capital and the inability to build professional networks in Canada. In addition, immigrant engineers lack Canadian work experience and education (George et al. 2011) which have both been found to be major barriers to finding employment for visible minority immigrants (Oreopoulos 2011). The lack of Canadian work experience and education are used incorrectly as a signal of a lack of language proficiency and in turn used to legitimize exclusionary practices based on race (Oreopoulos 2011).

Discrimination for visible minority immigrants is specific to their visible minority status and discounting foreign credentials allows employers to display covert racism without appearing prejudiced (Esses et al. 2007). George and Chaze (2014) add that rhetoric of multiculturalism and belief in an equal Canadian society plays a part in concealing discrimination and producing a discourse that visible minorities can no longer see themselves as victims of discrimination. Instead, the reality is that discrimination for minority groups does not actually occur less frequently, rather, it might just be harder to identify (Sue et al. 2009).

Altogether, this suggests that both gender and racial/ethnic discrimination might occur at equal rates than the past, but they might occur in novel ways or ways that are more subtle. In all cases, this is dangerous because discriminatory practices can become normalized and taken for granted. Many studies have focused on barriers in finding work. Instead, the focus of the current study is an exploration of barriers over the course of careers. This phenomenon is equally important but relatively understudied in comparison and could be an arena where barriers occur in novel and subtle ways. Thus, research which continues to highlight, critique and challenge

these practices is vital. This next section introduces homophily as a lens to better understand how gender and racial/ethnic discrimination might occur.

Introducing Homophily as a Lens

Homophily

One of the mechanisms by which processes of inequality manifest is homophily. Homophily describes the process in which individuals develop ties to other individuals or groups who are similar to them. This often occurs organically as individuals naturally have a preference for similar others with whom they may relate. One subtle way that homophily preferences can manifest is through cultural similarities which can impact hiring, promotion and interactions with colleagues (Rivera 2012). Commonly, factors such as similarities in extracurricular interests and personality traits become increasingly significant factors; however, the extent to which individuals share interests, tastes, preferences and habits is largely structurally determined by an individual's class, race, gender, neighbourhood and overall social location (Rivera 2009). In all cases, homophily processes can potentially occur along several axes in ways that compound and intersect (Crenshaw 1991) to contribute to inequalities (Kanter 1977; McPherson, Smith-Lovin and Cook 2001).

Homophily in workplace organizations becomes detrimental when it becomes exclusionary and excessive. In other words, homophily is unfavourable when certain individuals or groups become overrepresented in certain occupations and positions, at the expense of others becoming underrepresented (Kanter 1977; McPherson, Smith-Lovin and Cook 2001). Historically, white men have been overrepresented in professions and management, while women and visible minorities have been underrepresented (Dickerson 2008; Kanter 1977; Rivera 2012; Roth 2004). Homophily has the potential to be detrimental in these instances because if white men disproportionately hold positions as managers they will likely hire, promote and interact with

individuals who are also white men (Dickerson 2008; Kalev, Dobbin and Kelly 2006; Kanter 1977; Rivera 2012; Roth 2004). In this way, homophily preferences can lead to occupational segregation in which workers become distributed differently within the same occupation (vertical segregation) or distributed across different occupations or industries (horizontal segregation) (Charles 2003; Marin 2012; Roth 2004).

Homophily processes are powerful because they do not only occur at the discretion of employers but instead, are also produced in daily interactions (Roth 2004). These actions then produce boundaries establishing in-groups and out-groups in ways that define belonging. Consequently, this often leads to feelings of loneliness and lack of attachment to coworkers for individuals who experience exclusion.

Homophily can operate in a variety of ways to lead to disadvantage of minority groups. Apart from homophily leading to biases in candidate evaluation (Graves and Powell 1995), homophily processes tend to occur in two ways in work organizations: reduced opportunities to perform and out-casting from social events (Roth 2004). First, homophily preferences often manifest in reduced opportunities to perform through differential assignment to accounts, deals or projects which impacts promotion and raises. Those who are able to put together evidence for why they merit promotion, in the form of a history of effective work, are much more likely to be promoted. Often, women and visible minorities are not able to show their skills and effective work. This is because they are not offered the deals or asked to collaborate in group projects at the same rate as whites or men which makes it difficult for them to make a compelling case for why they merit a promotion or raise (Roth 2004). Additionally, homophily preferences manifest in out-casting of certain groups from social events. Homophily preferences in this form often occur in male-dominated professions (Roth 2004), where it is common for men to play or watch

sports together or go out for dinner without inviting women. In addition to not getting invited to social events, those that differ from the majority could also feel excluded daily by being ignored at work. This intentional disregard for minorities can make it harder to develop rapport with coworkers. In turn, this could lead to feelings of exclusion (Roth 2004).

Homophily preferences can be particularly high in white-collar work and professions like engineering, where collegial work environments and status are highly prized (Rivera 2012; Ashley and Empson 2016). Since all applicants have similar education and training, factors other than job relevant skills become particularly relevant in hiring and promotion (Rivera, 2012). Consequently, subjective impressions then become the most important determinants of interview and promotion evaluations (Graves and Powell 1995).

In addition to these micro-level processes, hiring and promotion procedures also encourage homophily to the disadvantage of visible minorities and women. High-level professions such as engineering can often be characterized by a merit model of promotion where employees are rewarded for work performance and productivity (Kahn and Sherer 1990; Mandt 1984).

Unfortunately, it is difficult to assess performance in highly complex and diverse tasks which can lend itself to employer bias when making promotion decisions especially in cases where effective work and criteria for promotion are not clearly delineated (Castilla 2008; Mandt 1984).

Macro-level labour market trends are also an important factor that could influence the extent of homophily preferences. In labor surpluses where supply outweighs demand – such as in Ontario (Engineers Canada and Canadian Council of Technicians and Technologists 2009), employers might be more prone to engage in discriminatory practices and indulge in their preferences to differentiate amongst similarly qualified candidates.

Consequences of Gender and Racial Barriers

Underemployment and Limits to Promotion

The consequence of gender and racial barriers at work can be wide-ranging and severe. A major consequence that can typically occur is underemployment. Underemployment occurs when individuals settle for jobs below those typically done by others with similar education levels, skill sets or expertise (Dooley and Prause 2004). Underemployment often occurs due to a combination of structural factors and varying forms of discrimination which can make it difficult for individuals to find suitable employment which matches the work done by individuals with similar education levels, skill sets or expertise (Shuey and Jovic 2003). Those who experience underemployment can suffer in terms of hiring, promotion and income and will typically need to settle for jobs with lower levels of autonomy and authority than they would ideally like to have.

This might include being an employee when an individual has the pre-requisites to be a manager or being in a lower level management position when an individual has the required skills to take on an upper management position. For this reason, workplace position surrounding managerial status, such as whether an individual is a manager or an employee, is a focal point of this paper because the literature suggests that minority groups continue to be underrepresented in managerial positions (Dickerson 2008; Kanter 1977; Rivera 2012; Roth 2004). Particular attention to barriers in management is important for two major reasons. First, barriers to management positions which often are more highly compensated than conventional employee roles, leads to occupational vertical segregation. The result is that minority groups are overrepresented in less compensated roles and underrepresented in more greatly compensated roles which could lead to income differences (Marin 2012). Second, a lack of minority groups in management also means a lack of power to participate in decision-making processes surrounding hiring and promotion. The literature suggests that simply allowing a greater number

of minority groups in managerial positions might be a crucial first step in reducing inequality based on homophily because it makes it less likely that white men receive preferential treatment in hiring and promotion (Kalev et al. 2006). If minority groups are prevented from access to participation in managerial roles, cyclical inequality wherein marginalized groups continue to experience marginalization is maintained.

Importance of the Current Study

Engineers are a particularly fruitful case for studying differences in income and workplace position along gender and racial lines. Statistics Canada data suggests that engineering is among the most common professions for visible minority men in Canada (Statistics Canada 2016). It is also a profession wherein few women are employed. In this way, it allows for an excellent case of a high-level profession that continues to be disproportionately male and where racial/immigrant barriers habitually persist despite increased inclusion based on raw numbers (Statistics Canada 2016). Therefore, a deeper analysis of the reasons for the continued barriers for minority groups in engineering can progress the discourse as it is a setting where homophily preferences and discriminatory workplace practices might be particularly salient. The current study also progresses the discourse on homophily preferences in Canada which has been relatively understudied compared to the United States (Dickerson 2008; Kanter 1977; Rivera 2012; Roth 2004). Canada prides itself on multiculturalism (Ozensel 2013), yet, Atkins (2006) finds that minority groups in Canada continue to fare poorly both economically and in raw total numbers in the labour force perhaps in part attributed to homophily preferences. Previous research has noted that there are institutional disadvantages for individuals in hiring and promotion on factors such as race and gender. However, fewer research has explored the reasons for these outcomes (Rivera 2009) which includes the subtle factors that influence the evaluation, comparison and exclusion of employees (Fernandez and Weinberg 1997; Gross

2009; Rivera 2012). For this reason, a mixed-methods design seems warranted to simultaneously explore broader trends and the processes underlying these trends. This article investigates gender and racial barriers in Canadian engineering in the form of rewards and explores potential reasons for these barriers through a mixed methods case study of the engineering profession in Ontario, Canada. The core research questions are as follows:

1. What are the differences in income of professional engineers in Ontario along gender and race?
2. In addition to income, do women and ethnic minorities experience barriers in acquiring non-monetary rewards in the form of credit (recognition/verbal affirmation), job authority and job autonomy? Is there evidence of underemployment or other limits to promotion?
3. What processes are underlying potential barriers for women and visible minorities within the engineering profession? Is there evidence of gender and racial homophily?

METHODOLOGY

Survey Instruments and Measures

The current study employs the use of pre-existing survey data and parallel interviews (Adams 2020). The data were collected as part of the Canadian Workers in the Knowledge Economy Engineering Survey (CWKE). The data set is from a survey conducted with members of the Ontario Society of Professional Engineers (OSPE) with 799 respondents, and parallel in-depth interviews with 53 members. In this way, the data set allows for nesting, permitting within subject confirmation and through a complementary design, allows further analysis of individual units. Nesting allows for validity to be strong by drawing on the same samples at each phase of the study (Creswell and Creswell 2018). The data set is the first of its kind in Canada to explore different class positions of professional engineers in addition to current working conditions in the field and use of specialized skills in a changing labour market (Adams 2020). The surveys

were conducted in fall 2016 and winter 2017. They asked respondents a wide range of questions about working conditions, organizational roles, education, experience, training and professional development and attitudes (Adams 2020). Analyses presented in this paper are focused on three aspects. First, the survey asked respondents to self-identify their race and gender. As mentioned earlier, recent literature suggests that engineering continues to be an excellent case of a high-level profession that continues to be disproportionately male and where racial/immigrant barriers habitually persist despite increased inclusion based on raw numbers (Statistics Canada 2016). Second, the survey asked questions surrounding income and workplace position. The quantitative analysis will focus on differences on the distribution of income and workplace position based on racial and gender lines. Third, questions surrounding underemployment, perceptions of credit, autonomy and authority are also of particular interest (Adams 2020). Sue et al. (2009) have argued that discrimination for minority groups does not actually occur less frequently in contemporary society, rather it is likely that it simply occurs in new ways that are more subtle and harder to identify. In this way, underemployment, limits to promotion and non-monetary rewards can be new ways in which women and visible minorities are 'included' but in ways in which they continue to be disadvantaged through job conditions, roles or rewards.

Strengths of an Explanatory Mixed-Methods Design

Three related reasons are motivating a mixed-methods design. I noted in the literature review that previous research has often been effective at highlighting that institutional disadvantages do exist for minority groups at work, however, fewer studies have explored the reasons for these outcomes (Rivera 2009). As such, the main rationale for choosing mixed methods is to develop a better understanding of processes and outcomes in order to evaluate them and explore potential solutions. Second and related to this, mixed-methods designs allow quantitative results to be explained with qualitative data. The quantitative data will be effective at answering (1)

how income and workplace position differ among Canadian engineers along race and gender lines and (2) instances of underemployment and limits to promotion among Canadian engineers based on race and gender. In this way, quantitative data is better equipped in demonstrating broader trends in engineering related to differences in income, managerial status, underemployment and perceptions of work conditions, roles and rewards based on race and gender. Nevertheless, it remains quite ineffective for understanding the reasons for any differences. Interview data can reveal important insights, not possible solely with survey data, surrounding the processes that are leading to any differences and in this way, is more equipped for answering different kinds of research questions. Specifically, interview data can help answer (3) what kinds of processes are underlying potential barriers for women and visible minorities and whether there is evidence of gender and racial homophily. In this way, the strength of the mixed-methods design lies in its complementarity – as interviews can compensate for the inherent weaknesses of the survey (Small 2011).

Finally, the design will help advance understanding of changes needed for marginalized groups. Underlying this research then, is a transformative worldview that recognizes the multiplicity of experiences of diverse groups and the varying degree of oppression, domination and power based on these master categories of race and gender. In this way, the goal for this research is to develop better understanding of inequities and linking them to the political and social action that is necessary for change (Creswell and Creswell 2018). Altogether, this suggests that the nature of research lends itself to an explanatory sequential mixed methods design. Explanatory mixed-methods designs involve the collection of quantitative and qualitative data. The study begins with statistical analysis using the software SPSS. Subsequently, qualitative interview data is analysed to better understand the processes underlying statistical trends.

Quantitative Analysis

The dependent variables of interest are income, workplace position, and overqualification.

Income is operationalized as the amount of money a professional engineer in Ontario earns annually through employment in one year (January 1-December 31, 2015) before taxes and other deductions. This measure was categorical. Workplace position is operationalized as whether a professional engineer in Ontario reports having a managerial role or reports not having a managerial role at their place of work. A managerial role is one which involves supervising, managing, hiring or promoting other employees. Overqualified is operationalized as whether a professional engineer in Ontario reports having more schooling than is required in their jobs.

The independent variables of interest are race and gender. Race is operationalized as self-identification as a visible minority or a non-visible minority. In the survey, the gender question was open-ended, but all responses fell into a gender binary and have been categorized as man or woman.

Qualitative Analysis

Interviews were conducted with 53 engineers and engineering degree holders, either by phone, in-person or over skype; interviews lasted 40-70 minutes in length. The sample of participants for interviews were also purposefully selected to ensure adequate representation of engineers in different class positions (managers, employees and self-employed), and across gender and sector (private and public) (Adams 2020). Participants were asked about current and previous jobs in engineering, career development and progression and their experiences in the workplace.

Analysis of interview data was primarily inductive, and transcripts were reviewed and focused mainly on questions dealing with race, gender, income, workplace positions, underemployment, discrimination and workplace practices. This material was pulled out for further analysis,

beginning with open coding eventually becoming more focused and moving towards categorical coding (Adams 2020; Charmaz 2014; Hesse-Biber 2018).

To answer the research questions pertaining to career opportunities and advancement, original emergent themes were broad and data analysis focused on the following: (1) career development and trajectories with particular attention to variations in career opportunities based on race and gender; (2) satisfaction and perceptions of work positions, responsibilities, roles, conditions or organizations (which will include differences in status and income, evidence of underemployment); and (3) potential reasons for income and promotional barriers (homophily preferences, self-selection, direct or indirect perceived discrimination and exclusionary practices, workplace practices and policies). Throughout the presentation of qualitative material, pseudonyms will be used, and potentially identifying details about individuals' jobs have been removed to ensure confidentiality. The results section uses selected interview quotes, many of which are edited slightly to make them more accessible to readers.

FINDINGS

Gender Barriers

Table 1.0

Differences in Income Based on Gender (Gender and Income)

Gender		Income				
		Less than \$50,000	\$50,000-\$89,000	\$90,000-\$199,000	\$200,000 or more	Total
Female	Count	16	43	25	2	86
	Expected	12.4	34.2	35.7	3.8	86.0
	Count	18.6%	50.0%	29.1%	2.3%	100.0%
Male	Count	53	148	174	19	394
	Expected	56.6	156.8	163.3	17.2	394.0
	Count	13.5%	37.6%	44.2%	4.8%	100.0%
Total	Count	69	191	199	21	480

Expected	69.0	191.0	199.0	21.0	480.0
Count					
%	14.4%	39.8%	41.5%	4.4%	100.0%

The quantitative analyses demonstrate gender barriers for women in terms of income. A larger percentage of women than men report earning less than \$50,000. In addition, the largest proportion of women in engineering earn in the \$50,000 - \$89,000 range compared to the largest proportion of men in engineering earning in the \$90-000 - \$199,000 range.

Table 2.0

Differences in Perception of Credit Based on Gender (Gender and Perceptions of Credit)

Gender		At my workplace, men get more credit for their contributions and skills than women do.					Total
		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	
Female	Count	8	17	9	39	33	106
	Expected	21.3	40.2	20.4	15.3	8.9	106.0
	Count						
	%	7.5%	16.0%	8.5%	36.8%	31.1%	100.0%
Male	Count	105	196	99	42	14	456
	Expected	91.7	172.8	87.6	65.7	38.1	456.0
	Count						
	%	23.0%	43.0%	21.7%	9.2%	3.1%	100.0%
Total	Count	113	213	108	81	47	562
	Expected	113.0	213.0	108.0	81.0	47.0	562.0
	Count						
	%	20.1%	37.9%	19.2%	14.4%	8.4%	100.0%

Gender barriers were further supported by women being much more likely to agree that men are more likely to receive more credit for their contributions and skills than women. More than half of the women in the sample agree or strongly agree that men receive more credit for their contributions and skills. Though, quantitative analyses were unable to reveal any statistically

significant differences in participation in management between men and women. It is likely the case that the lack of differences is reflective of small sample sizes available in the data set rather than being an accurate reflection of the lack of barriers to women entering management.

Racial Barriers

Table 3.0

Differences in Income Based on Race (Race and Income)

Visible Minority		Income				
		Less than \$50,000	\$50,000-\$89,000	\$90,000-\$199,000	\$200,000 or more	Total
Yes	Count	24	40	30	2	96
	Expected	13.9	37.7	40.4	4.1	96.0
	Count					
	%	25.0%	41.7%	31.3%	2.1%	100.0%
No	Count	44	145	168	18	375
	Expected	54.1	147.3	157.6	15.9	375.0
	Count					
	%	11.7%	38.7%	44.8%	4.8%	100.0%
Total	Count	68	185	198	20	471
	Expected	68.0	185.0	198.0	20.0	471.0
	Count					
	%	14.4%	39.3%	42.0%	4.2%	100.0%

The quantitative analyses performed revealed that race does influence income with visible minorities more likely to earn less than whites.

Table 4.0

Differences in Underemployment Based on Race (Race and Underemployment)

Visible Minority		In terms of schooling, do you feel you are qualified for your current (or more recent) job?					Total
		Very Over-qualified	Somewhat at Over-qualified	Adequately Qualified	Somewhat at Under-qualified	Very Under-qualified	
Yes	Count	18	24	61	7	0	110

	Expected Count	8.1	24.7	68.8	7.7	.6	110.0
	%	16.4%	21.8%	55.5%	6.4%	0.0%	100.0%
No	Count	21	95	270	30	3	419
	Expected Count	30.9	94.3	262.2	29.3	2.4	419.0
	%	5.0%	22.7%	64.4%	7.2%	0.7%	100.0%
Total	Count	39	119	331	37	3	529
	Expected Count	39.0	119.0	331.0	37.0	3.0	529.0
	%	7.4%	22.5%	62.6%	7.0%	0.6%	100.0%

Table 5.0
Differences in Managerial Positions Based on Race (Race and Manager)

Visible Minority		Do you have a managerial or supervisory role at your place of work?		
		Yes	No	Total
Yes	Count	42	64	106
	Expected Count	55.5	50.5	106.0
	%	39.6%	60.4%	100.0%
No	Count	228	182	410
	Expected Count	214.5	195.5	410.0
	%	55.6%	44.4%	100.0%
Total	Count	270	246	516
	Expected Count	270.0	246.0	516.0
	%	52.3%	47.7%	100.0%

In addition, visible minority engineers far more likely to report being overqualified /underemployed and far less likely to be managers.

Table 6.0
Differences in Type of Managerial Position Based on Race (Race and Type of Manager)

Visible Minority	Which of the following best describes the managerial role you have at your place of work?	
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		Owner or Co-owner	Upper level manager	Middle Level Manager	Lower Managerial Position	Total
Yes	Count	2	5	10	9	26
	Expected Count	5.6	7.7	7.4	5.2	26.0
	%	7.7%	19.2%	38.5%	34.6%	100.0%
No	Count	41	54	47	31	173
	Expected Count	37.4	51.3	49.6	34.8	173.0
	%	23.7%	31.2%	27.2%	17.9%	100.0%
Total	Count	43	59	57	40	199
	Expected Count	43.0	59.0	57.0	40.0	199.0
	%	21.6%	29.6%	28.6%	20.1%	100.0%

Table 7.0
Differences in Deciding Working Hours Based on Race (Race and Autonomy)

Visible Minority	Can you decide your own working hours?			
		Yes	No	Total
Yes	Count	46	60	106
	Expected Count	66.1	39.9	106.0
	%	43.4%	56.6%	100.0%
No	Count	280	137	417
	Expected Count	259.9	157.1	417.0
	%	67.1%	32.9%	100.0%
Total	Count	326	197	523
	Expected Count	326.0	197.0	523.0
	%	62.3%	37.7%	100.0%

Table 8.0
Differences in Desire for More Say in Decisions at Work (Race and Authority)

Visible Minority		Would you like to have more say than you do now in decisions in your workplace?		
		Yes	No	Total
Yes	Count	71	27	98
	Expected Count	55.9	42.1	98.0
	%	72.4%	27.6%	100.0%
No	Count	204	180	384
	Expected Count	219.1	164.9	384.0
	%	53.1%	46.9%	100.0%
Total	Count	275	207	482
	Expected Count	275.0	207.0	482.0
	%	57.1%	42.9%	100.0%

In cases where visible minority engineers were able to attain managerial positions, analyses reveal that they are overrepresented in lower level management where they are more likely to express both lower levels of autonomy and authority. They express the desire for both more control over work hours and greater influence in decisions at work. Increasing entry by visible minorities into managerial positions is undoubtedly a promising finding suggesting some evidence of reduced barriers, though, survey data reveals that they are overrepresented in lower level management. These positions have lower salary, status, autonomy and authority. Thus, the overrepresentation of marginalized groups in lower level management positions is evidence of visible minorities being underemployed as they are becoming increasingly 'included' but in ways that they are still disadvantaged. Altogether, the findings indicate strong evidence of limits to promotion and underemployment/over-qualification for visible minority engineers.

Underemployment and Limits to Promotion

Further, interviews reveal that the experiences of low-level managers in engineering are unfavourable and much different than the experiences typically associated with management positions. Low-level management positions are often not advantageous to those that accept such

positions. Charles contends that “*most of the low-level managers are getting much less than their counterparts, the union engineers*” making “*lower-level managers the major losers.*”. He believes that an “*inverted organization is emerging in engineering*” where many senior engineering employees will out-earn lower-level managers. Charles regrets having taken a lower level management position himself saying, “*if I had remained in the union position, I would have been getting at least \$20,000 more per year.*” In this way, although management positions are assumed to be advantageous, insights from interviews reveal individuals in management often find themselves in disadvantageous positions through accepting such positions. Lower level management positions in engineering are increasingly being offered and accepted by those who are less qualified and with fewer experience. “*It’s only a person with three, four, five years of experience that are becoming managers. Anybody senior [will not] be becoming a manager.*” Individuals with seniority are increasingly turning down managerial positions in favour of more technical roles where they can and often do reap greater rewards. In this way, management positions are not typically accurately reflective of effective work nor are they a reliable indicator of career success or progression. Thus, although there is evidence of marginalized groups increasingly entering into managerial positions based on survey data, it does not necessarily translate into other associated benefits typically assumed with the role like increased prestige, autonomy, authority or income especially in lower-level management positions. In this way, overrepresentation by minorities in lower-level management positions provides evidence for the argument put forth by Sue et al. (2009): barriers for minority groups do not actually occur less frequently, rather, they might just occur in new ways that are harder to identify. Overall, survey and interview findings reveal that both women and visible minorities experience barriers in the

form of monetary and non-monetary rewards. Interview data further shed light on the factors that are likely contributing to these barriers.

Homophily

Earlier, this paper introduced the concept of homophily as a lens to better conceptualize how discriminatory practices can manifest themselves in new, subtle ways. Interviews suggest some evidence for homophily processes along both gender and racial lines. In the case of women, homophily preferences are widespread and often came in the form of exclusion from daily work interactions as men preferred to interact with male colleagues for reasons of comfort, and detrimental inferences surrounding the knowledge that women brought to work organizations. Many men mistrust their female colleagues and in turn, this likely impacts the interactions that men have with women at work. For some women, like Delilah, mistrust stems from detrimental inferences and stereotypes about the types of capital and knowledge that women bring into engineering which can play a role in defining women's self-realization in terms of traditionally feminine work roles (Seidman 2017). This resulted in her being hired as an engineer but also being forced to engage in secretarial duties "*as an administrative assistant*" where she was "*expected to make coffee in the morning*". Delilah believes that employers in the first job that she landed might have been actively seeking out a woman with the intention of having an engineer perform dual roles. "*They kind of wanted an engineer and administrative assistant*", she explains. Administrative tasks were tasks not expected of her male counterparts. It was also work that took away from time she could have been spending on engineering which is detrimental to her own career. Roth (2004) contends that a major way gender homophily manifests itself is in reduced opportunities to perform for women through differential assignment to projects which can impact promotion and raises. Those who are able to put together evidence for why they merit promotion, in the form of a history of effective work, are much more likely to be promoted and rewarded

(Roth 2004). As Delilah's case demonstrates, women are far more likely to be asked to do tasks where their skills are not being used, optimized, recognized and rewarded - perhaps relegated to stereotypically feminine roles as secretaries or assistants. In this way, women are not able to show their skills and effective work if they are given devalued tasks related to scheduling or assisting rather than engineering work where they can demonstrate their competency and make a case for a promotion or raise and in turn, impacting the credit they receive for work.

Ying recalls one particular instance, while working on a project where she had the greatest levels of expertise and familiarity that:

"...people would still approach [her] male colleague that had nothing to do with the project and ask them questions. He'll be trying to explain that he doesn't know anything about it".

The ability for women to put together evidence for a history of effective work in order to reach promotion can also be impeded if they are not asked to collaborate in group projects at the same rates as their male counterparts (Roth 2004). If men have the option to work on a project in groups, and homophily processes are occurring, they are very likely to ask other men to collaborate on group projects to the detriment of women. Homophily in the form of group projects can be one of the many subtle barriers that women can experience in attaining a raise or promotion. Consequently, this can partly be contributing to the quantitative findings related to gender differences in income and the finding that women are more likely to believe that men get more credit for their contribution and skills.

Moreover, Ying believes that women have a role to play by being *"...open-minded"*. She adds that *"it is not like they're trying to [kick] all women out, it's just a habit. Their intentions are good, so I think just understanding that it's totally fine"*.

In the situation cited earlier, where the colleague is approached on a project in which Ying had the highest levels of expertise, she avoids directing feelings of hostility and resentment. Instead,

she attributes this action and those like to “*so many more men in the industry that it’s hard to always do that differentiation if you’re just like always, talking with men. Then having women around is just like not common*”. These two quotes taken together suggest evidence of gender homophily. Ying is suggesting that males in engineering prefer to interact with other males because that is the norm, a habit that they are used to and are most comfortable doing. This is likely because they are not used to interacting effectively and appropriately with women with so few of them being in engineering. Though, instances such as these can inevitably lead to feelings of exclusion of female engineers at work. Homophily preferences can often occur in the form of out-casting from social events which can include being excluded from events outside of work in addition to mundane daily interactions at work. Those that differ from the majority could feel excluded by being ignored. This intentional disregard for minority groups can make it harder to both fit in and develop rapport with coworkers. In turn, this could lead to feelings of exclusion (Roth 2004).

Although Ying harbors no resentment at such exclusionary interactions, these impacts of such interactions can be felt by the entire profession if it happens ubiquitously. Insight from one engineer, Gabriella, suggests that engineering, perhaps more than other professions, depends on collaborations between colleagues to find solutions in ways that maximize time and results. She notes that “*it is very helpful to discuss with other engineers – it saves you time, it helps you see another view*”. The increased need to collaborate might stem from strict regulations and codes that govern engineering practices. Gabriella notes that “*You have to read the code - they update the code every two, three years or whenever they feel that something needs change. You have to review - so, I think it’s a constant process*”. It is nearly impossible to know every change in a constantly changing and demanding profession so having colleagues with different areas of

expertise to inform you of any important new codes is particularly crucial. Though, if other engineers are unwilling, reluctant or uncomfortable interacting with women, it can create barriers in completing work successfully and in a timely manner. In this way, a culture of an ‘old boys club’ that excludes women could be particularly prevalent and detrimental to women in engineering compared to other professions. Altogether, such processes can impact the kind of work that women are given, are included in, and are able to do in a timely manner, which impacts raises and promotion. In turn, this is likely contributing to quantitative findings related to women receiving less rewards both monetary and non-monetary (in the form of credit). The result can be women leaving the organization or at an extreme, leaving the engineering profession entirely, which, in addition to more blatant forms of discrimination, is likely a large factor contributing to barriers surrounding successful integration and low numbers of women in engineering.

In addition to gender lines, there is strong evidence to suggest that homophily processes along racial lines are apparent and can be particularly detrimental in promotion. Homophily preferences based on race might come in the form of soft skills required in achieving upward mobility. Soft skills are increasingly important in progressing successfully within engineering. Though, the kind of cultural capital and soft skills required to excel in engineering in Canada likely disadvantages visible minority foreign trained engineers many for whom English is not their first language which can create barriers in promotion based on race.

Many respondents highlighted that communication and leadership have become increasingly important as engineering has shifted from a profession that once solely required technical skills to *“more project management, mostly based on interaction with people and all the soft skills”*. Gabriella notes that a greater need for a variety of skills is especially important to achieve

mobility within engineering. *“It is very important if you want higher positions. If you want to grow you need all of them.”* In this way, those able to find the most career success in engineering are those that are those that are affable. They possess the ability to connect to colleagues and clients, while simultaneously possessing a wide skillset. Interviews suggest that cases like those of Arthur, in which they claim to possess the necessary soft skills, are an aberration and quite rare for visible minority foreign trained engineers. Gabriella argues that the necessary soft skills, like communication and leadership that are consistently sought after in Canadian engineering workplaces, are hard to acquire and demonstrate. She believes that this is especially the case for *“non-Canadian engineers”* for whom *“English is not their native language”*. This is not to say that foreign trained visible minority engineers are not able to have strong soft skills and be effective communicators in their countries of origin. Rather, Gabriella is suggesting that it is more difficult for foreign trained visible minorities to acquire and demonstrate the soft skills and cultural capital valued in Canada because of increased disadvantage. These barriers can come in the form of language barriers in addition to familiarity with cultural norms. This is an important consideration because the degree to which managers believe individuals have the necessary soft skills likely involves a degree of subjectivity. In other words, the individuals who managers promote are likely individuals who are affable, well-liked and people with whom they themselves, colleagues and clients can relate with. In this way, factors such as extracurricular interests and personality traits become increasingly significant factors, however, the extent to which individuals share interests and personality traits is largely structurally determined by factors such as race (Rivera 2009). Additionally, disadvantages can exacerbate in work organizations that implement merit models of promotion, a common phenomenon in high level occupations such as engineering. Without clearly delineating what

strong soft skills are, biases in evaluation and promotion of candidates can inevitably develop likely to the detriment of visible minority foreign trained engineers (Castilla 2008; Mandt 1984). Esses et al. (2007) contend that discounting foreign credentials is one major way employers are able to display covert racism without appearing prejudiced. Often, this manifests itself as a lack of Canadian work experience and education used to legitimize exclusionary practices based on race (Oreopoulos 2011). The finding of these interviews suggests that promotion in engineering is increasingly being based on soft skills. Yet at the same time, soft skills are unduly difficult to acquire and display for visible minority foreign trained engineers. Thus, this phenomenon could be another way to display covert racism without appearing prejudiced. While the discounting foreign credentials might be particularly detrimental in hiring, upward mobility based on soft skills might be particularly detrimental in promotion.

The effects of homophily preferences along axes like race can be particularly exacerbated in contemporary society due to macro-level trends which define Canadian labour market opportunities. Gabriella attributes this phenomenon to an increased supply of engineers but a relatively stable demand noting that *“the market is kind of saturated now, compared with 15 years ago.”* She believes that 20 years ago, foreign trained visible minority engineers, with weaker language skills and a smaller skill set, were in a better position to land highly coveted jobs. In labor surpluses where supply outweighs demand – such as in Ontario (Engineers Canada and Canadian Council of Technicians and Technologists 2009), employers might be more prone to engage in discriminatory practices and indulge in their preferences to differentiate amongst similarly qualified candidates in hiring and promotion decisions. Overall, the findings suggest more attention must be paid to how the acquisition of cultural capital, which includes the acquisition and reception of soft skills, can be a racialized phenomenon. While much

research has focused on cultural capital being increasingly nuanced and restricted based on class dimensions (Rivera 2012), fewer research has focused on the racial barriers of acquiring and successfully demonstrating cultural capital. The finding that soft skills have become increasingly important but that barriers might be exacerbated for non-Canadian engineers highlights that this phenomenon merits increased consideration. The burden for visible minorities is greater because visible minorities need to prove themselves capable in an arena wherein white norms and models are rewarded and whose own heritage has historically devalued and dehumanized those that did not successfully fit into them (West 1999). Thus, visible minorities and foreign-trained individuals being excluded from managerial positions masked under the guise of weak soft skills can become one way that racial inequality persists in a more subtle fashion. Altogether, such processes are likely contributing to quantitative findings related to limited entry of visible minorities into upper management – and the many associated benefits of such positions like increased income, autonomy and authority. Those who are perceived to have strong soft skills and the required cultural capital likely acquired it after years in Canada and where they were exposed to individuals from whom they were able to acquire it.

DISCUSSION

Ultimately, this paper highlights existing gender and racial barriers in engineering that can negatively impact opportunities and outcomes leading to differences in income, limits to promotion and in some cases, underemployment. For both women and visible minorities, there is evidence of barriers related to both monetary and non-monetary rewards. Quantitative analyses reveal that women earn less than men and are more likely to express that they do not receive equal credit for their contributions and skills. Though, quantitative analyses were unable to reveal any statistically significant differences in participation in management between men and women. Visible minorities are also likely to earn less, but the barriers extend beyond

income differences. Visible minorities are more likely to be over-qualified, forced into lower level positions where they express the desire for more autonomy and authority. Increasing entry by visible minorities into managerial positions is undoubtedly a promising finding suggesting some evidence of reduced barriers for visible minorities within engineering, though, survey data reveals that they are overrepresented in lower level management. These positions have lower salary, status, autonomy and authority. Thus, the overrepresentation of marginalized groups in lower level management positions is evidence of visible minorities being underemployed as they are becoming increasingly 'included' but in ways that they are still disadvantaged. In this way, affirmative action policies which attempt to reach hiring and promotional quotas are not adequate on their own as they can be prone in missing these subtle nuances. Insights from interviews also reveal the de-valuing of lower level managerial positions in engineering and an increasing reluctance for many qualified senior engineers to take on managerial positions due to perceptions of career hindrance upon doing so. In this way, the participation of minority groups in managerial positions — especially lower level ones, must be regarded with skepticism. The participation of visible minorities in lower-level managerial positions does not indicate integration and the absence of barriers. In addition to securing managerial positions, income, authority and autonomy are some other significant factors to consider in combination when considering if marginalized groups are progressing successfully within work organizations. This paper used the concept of homophily as a lens to better conceptualize how discriminatory practices can manifest themselves in new, subtle ways and the processes that may be underlying these practices. In the case of women, homophily preferences are widespread and often came in the form of exclusion from daily work interactions as males preferred to interact with male colleagues for reasons of comfort, and detrimental inferences surrounding the knowledge that

women brought to work organizations. Findings reveal that exclusions of these sorts could be particularly detrimental in engineering because of the nature of engineering to be dynamic – constantly changing which makes it difficult to effectively keep up to date with current codes without increased collaboration with colleagues. Altogether, such processes impact the kind of work that women are given, are included in, and are able to do in a timely manner, which impacts raises and promotion. In turn, this is likely contributing to quantitative findings related to women receiving less rewards both monetary and non-monetary (in the form of credit). Despite interview data suggesting strong evidence of barriers for women, quantitative analyses did not reveal any statistically significant differences in the ability for women to attain managerial positions. It is likely the case that the lack of differences is reflective of small sample sizes available in the data set rather than being an accurate reflection of the lack of barriers to women entering management.

Interviews suggest that homophily preferences based on race might come in the form of soft skills required in achieving upward mobility. Soft skills are increasingly important in progressing successfully within engineering. Though, the kind of cultural capital and soft skills required to excel in engineering in Canada likely disadvantages visible minority foreign trained engineers. For many, English is not their first language which can create barriers in promotion based on race. Insights that emerged from interview data also suggest that macro-level trends related to supply and demand could also play a factor in potentially increasing instances of homophily based on factors such as race. This is because employers might be more prone to engage in discriminatory practices and indulge in their preferences to differentiate among similarly qualified candidates when supply outweighs demand – a phenomenon currently occurring in Canadian engineering. Altogether, such processes are contributing to quantitative

findings related to barriers into upper management – and the many associated benefits of such positions like increased income, job autonomy and job authority.

Overall, the findings presented highlight the potential for new forms of contemporary discrimination and a phenomenon of democratic inequality, an ideology that permits two seemingly conflicting sets of values. A public perception of government working towards inequality on the one hand while simultaneously, a reluctance to investigate and address barriers when issues emerge (Henry and Tator 2005; 349). Research, like the current study, highlights the possibility and dangers of democratic inequality. It is important to continue to unmask inequalities in order to put pressure on the Canadian government to recognize historical barriers for marginalized groups. These historical barriers continue to have lasting influence in contemporary practices in work despite the Employment Equity Act and other affirmative action policies. Such findings call for the need for increased transparency and accountability of workplace organizations, rather than complacency, in their commitment to equality in the workplace through policy changes. At the very least, the study aims to contribute to greater awareness of sustained biases that contribute to inequality which can ideally lead to micro-level policing of discrimination. That is, self-policing by managers or policing of co-workers by employees can encourage fair hiring and promotion decisions.

One limitation of the study is that it was only able to look at one aspect of homophily preferences: individuals who experience barriers within work organizations in the form of pay, promotion and other non-monetary rewards. However, literature suggests that one major way that homophily operates is in hiring procedures. Future research could focus on job search outcomes of marginalized groups in engineering and could include interviews surrounding the experiences of those who are hired or unsuccessfully applied to a job. Ethnography and

participatory observation research can also be effective in studying motivations of employers when making hiring and promotion decisions and perhaps reveal biases that arise outside of their awareness. In all cases, future research should be performed with the goal of continuing to explore homophily preferences and exclusionary practices more greatly in the workplace, particularly in Canada and especially in professions like engineering, where barriers continue to be high.

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