Exploring gender differences in age-based discrimination at Finnish technology workplaces

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Introduction

Many engineering/technology workplaces are (still) characterized by masculine cultures, connected to various forms of discrimination (e.g., [1]). Discrimination has been suggested as one explanation for the persistent gender gap in engineering/technology [1], [2]. A recent meta-reanalysis of audit experiments [3] finds that women are discriminated against in hiring to relatively better paying male-dominated occupations, while women applicants are favored in the (relatively lower paying) occupations dominated by women. The authors conclude that gender-based employment discrimination thus preserves the status quo of gender distributions and earnings gaps [3].

Yet surprisingly few quantitative studies have examined discrimination towards men and women in engineering/technology workplaces. Previous studies exploring discrimination of women and racialized minorities (e.g., [2], [4]) have seldom elaborated on discrimination based on age. Meanwhile, potential discrimination experienced by (majority) men has rarely been studied. Moreover, little is known about how discrimination potentially impacts perceptions of equity climate within the work community.

The main objective of this paper is to explore how gender and age intersect in shaping perceptions of discrimination in technology workplaces. It aims to fill the identified research gaps by analyzing gender differences in perceived age-based discrimination encountered by university-educated engineering professionals in their work communities. The study also explores the linkages between age discrimination and equity climate in engineering/technology workplaces in the context of a Nordic welfare state, Finland.

Masculine cultures and discrimination in engineering/technology workplaces

Recent studies affirm that many engineering/technology workplaces are, to this day, characterized by culture(s) that favor men and masculinity [4–8]. As Cheryan and colleagues [1] describe: “In STEM fields, a masculine culture is a social and structural environment that confers a greater sense of belonging and ability to succeed to men than women”. Masculine

cultures in technology workplaces have been described as chilly or even hostile towards women (e.g., [8]).

Mainstream studies on women in engineering/technology rarely address workplace discrimination and some scholars downplay its importance (e.g., [9]). On the other hand, scholars drawing on critical feminist perspectives highlight that discrimination of women is a permanent feature of the masculine culture(s) in technology workplaces, and tolerating discrimination is an important coping mechanism for women, from students to more seasoned professionals [10–13]. For example, women engineering students in the U.K. were reluctant to admit they had been discriminated against, even seeking ways to justify their colleagues' actions [11]. Furthermore, women encountering discrimination often believe they can overcome it by proving their competence and thus their gender will eventually become insignificant [11–14]. This may be due to women adopting the professional culture of engineering, characterized by meritocratic ideology and individualism [14].

A recent mixed-methods study [4] addresses how the pressure to diversify has modified discriminatory decision making in software engineering, an occupation still dominated by 'white' men. The researchers expectedly find that 'black' men, 'black' women, and 'white' women each face callback penalties relative to 'white' men when applying laterally to early-career positions. Nevertheless, among applicants to mid-level positions, 'white' women are – surprisingly – preferred. Weishaar and colleagues explain that 'white' women possess the highest relative "diversity value" which they define as a market-based appraisal reflecting applicants' perceived worth toward organizational diversity [4].

Quantitative studies examining discrimination towards men and women in engineering/technology workplaces are, nonetheless, surprisingly few. Many of the studies mentioned earlier are qualitative and thus do not reveal the prevalence of discrimination in engineering/technology. While previous studies have addressed the intersecting impacts of gender and 'race' in technology/STEM [2], [4–5], [15], the intersections of gender and age remain largely uncovered (for one exception, see [16]). As Neely, Sheehan and Williams [5] point out, surprisingly little theoretical work has been done on age and ageism within the tech industry.

Ageism and age discrimination at work

Ageism refers to stereotyping and/or discriminating against a person or group based on their age. Posthuma and Campion [17] list stereotypes related to age and point out that most ascribe negative characteristics to older workers, such as poor performance, resistance to change and lower ability to learn. Kang and Kim [18] summarize that ageism towards older employees at the workplace can manifest either implicitly (through unconscious thoughts, feelings, and behaviors) or explicitly, through intentional actions or verbal expressions; ageism can also be self-directed; and exposure to ageism over time can result in the internalization of ageist attitudes and stereotypes. Nonetheless, McConatha et al. [19] argue that unlike racism and sexism, ageism (towards older employees) is often considered 'normal' in the workplace; hence, it is recognized and addressed less frequently as a form of discrimination.

Although the impact of ageism towards older employees has been studied widely (e.g., [17-18], [20]), its impact on younger workforce has attracted less interest [21]. Indeed, many studies on ageism only address stereotypes or discrimination towards older employees [17-19]. On the other hand, ageism is a gendered phenomenon. For example, McConatha et al. [22] find that especially older female workers frequently face ageism in the workplace. Other studies have discussed for example hiring discrimination towards women [3], [23]. Hence, more studies on the prevalence and impact of age-based discrimination encountered by employees of different ages, as well as the gendered nature of such discrimination, are still needed.

Context of the study: Discrimination in Finnish engineering/technology workplaces

Finland is Nordic welfare state, renown for being one of the most gender-equal countries in the world (e.g., [24]). Nonetheless, the job market in Finland is highly gender segregated, meaning that most professions and workplaces are either male or female dominated. Women dominate (lower-paying) health and welfare as well as education sectors whereas men dominate (higher-paying) technical sectors such as engineering and ICT [25]. The percentage share of women starting engineering education in Finland has been among the lowest in OECD countries and has persistently remained modest: among those awarded degrees in technology, women accounted for 16 per cent in 1987 and 20 per cent in 2017 [26]. Currently, women account for 33 percent of new students of technology in university-level studies [27].

Although discrimination at work is prohibited in Finland by several laws, it appears more common than in most other European countries [28]. Prior studies demonstrate that discrimination at work is observed and experienced by women more often than by men [28–30] although both observations and experiences have somewhat decreased over time [30]. Women also experience age-based discrimination more often than men in all age groups. For example, a recent study by Statistics Finland [30] shows that in the age group under 30 years, women were much more likely to report experiencing age-based discrimination at work than men (women 16%, men 4%, total 10%).

In Finland, women working in male-dominated workplaces experience more discrimination than women in other types of workplaces, or men in any of these [29]. Focusing on university-educated engineering/technology professionals, Bairoh and Putila [31] find that gender-based discrimination towards women is a major problem, strongly linked to the masculine culture prevailing in the workplaces. The authors conclude that in the field of technology, the dominance of masculinity is the main cause of discrimination against women while dismantling masculine privilege(s) may lead to experiences of discrimination among men.

Research questions

In this paper, we analyze gender differences in age-based discrimination encountered by university-educated engineering professionals in their work communities. Moreover, we explore the linkages between age discrimination and equity climate in engineering/technology workplaces in Finland.

Our research questions are as follows:

- RQ1: Are there gender differences in experiences of age-based discrimination at work among engineering/technology professionals?
- RQ2: What kind of linkages exist between experiences of discrimination and equity climate within the work community?

Data and methods

Data used in this study is derived from a survey on ageism and age-based discrimination at work, conducted by a labor union for university-educated engineers in Finland. The data was

gathered via an anonymous web-based survey during May 20 – June 6, 2024. Two random samples of the union members (5,000 full members and 3,000 student members) were selected as the target group. Altogether 1,317 persons responded, response rate was 16%. Despite the somewhat low response rate, the respondents were deemed to represent all union members sufficiently adequately based on distribution by gender and age group. Therefore, the overall results were considered reliable and generalizable. Data from the union is available for scientific purposes via an application process.

For this study, we selected a subgroup of the respondents based on their labor market position (=salaried employment) and degree (=MSc in engineering/technology), ending with a sample n=708. Limiting the respondents to those in employment was due to our focus on age-based discrimination at work and the equity climate within the work community, and selecting only those with MSc Eng/Tech degrees helped to make the sample more coherent.

Age and gender were obligatory background variables. The respondents were asked to report their current age (in years), ranging in the sample from 24 to 70 (mean and median 44.0). For analysis purposes, age was categorized into three groups: 20-34 years, 35-49, and 50-70 years. For gender, the response categories were male/female/other/does not want to disclose. In the sample, 70.3% identified as men, 28.8% as women, 0.1% as other and 0.7% selected 'does not want to disclose'. Since only 6 persons in the sample did not identify as male/female, their gender was coded 'missing' in the analysis. Please see Table 1 for descriptive information on the sample.

Table 1. Descriptive information on the sample.

Variable	**% of Sample (n=708)**
Gender	70.9% men, 29.1% women (omitting missing cases, n=6)
Age group	27.3% (20-34 y), 37.4% (35-49 y), 35.3% (50-70 y)
Nationality	95.6% Finnish, 2.0% dual citizenship, 1.3% other EU/ETA, other nationality 1.1%,
Language	92.9% Finnish, 4.2% Swedish, 2.8% English
Sector/field	40.2.% industrial company, 19.7% IT/ICT company, 25.4% other private sector, 8.8% public sector (state/municipality), 3.0% university, 3.0% other
Position	66.1% expert, 20.5% middle management, 11.0% management, 2.4% other

The survey covered various aspects of equity in the work community and ageism and age-based discrimination, including perceived impact of one's age at work; situation if one

became unemployed; encountering of negative stereotypes and discrimination; and opinions on how to advance age equality in Finnish working life.

Concerning discrimination, we examined responses to the question: "Have you **personally experienced age-based discrimination** or inappropriate treatment in your work community within the past 24 months?" (emphasis in the original). Hence, age discrimination in this study is defined as the individual's reported experience of discrimination due to their age, i.e., their interpretation of discrimination or inappropriate treatment based on their age. As analysis methods, we used chi-square tests of homogeneity to compare results by gender and age group, with significance level $p < .05$.

To further understand the perceived discrimination, we analyzed the responses to the open comment field "Please tell more if you wish" (which followed questions about discrimination) by comparing them by gender and age group. Since some respondents referred to their previous responses on encountering negative age-based stereotypes, we compared these as well. Original comments (written in Finnish, English, and Swedish) have been translated into English for this paper by the authors.

The respondents were asked to rate six statements pertaining to **equity in the work community** on a 5-point Likert scale (1=fully disagree, 5=fully agree, 6=cannot say). The statements were the following: "The management of the organization is actively committed to the promotion of equality and equity"; "Equality is clearly visible in the work community (for example in official values, in dialogue between the employer and shop stewards)"; "Equity and equality promotion plans have been discussed in the work community (initiated by e.g. shop stewards or the health and safety representative)"; "Equality training sessions have been arranged for supervisors"; "Equality training sessions have been arranged for the personnel"; "The organization has provided clear instructions for equal treatment (e.g. relating to recruitment and working conditions)" [1]. We used chi-square tests of homogeneity to compare results by groups, and 3-way ANOVA to disaggregate the impact of gender, age, and experienced discrimination. We used significance level $p < .05$ throughout.

[1] The statements followed a prompt defining equity: "*Equity means treatment without segregation, in other words the fact that all people are equal, regardless of their gender, age, ethnic or national origin, nationality, language, religion or conviction, opinion, disability, state of health, sexual orientation, or any other personal cause."*

Findings

We started the analysis by cross-tabulating 'Experienced discrimination' (yes/no) by a. gender and b. age group. The results depicted in Table 2 show that women were nearly twice as likely as men to report having experienced age-based discrimination at work within past 24 months (11.3% and 6.2%, respectively). The difference was statistically significant ($\chi^2(1) = 5.20$, $p < .023$). Nonetheless, the prevalence of perceived discrimination varied considerably between age groups, with the lowest occurrence (3.4%) among respondents in the category 35-49 years and higher occurrences among the youngest (9.8%) and the oldest respondents (10.8%). The difference was statistically highly significant ($\chi^2(2) = 11.44$, $p < .003$).

Table 2. Experienced age-based discrimination, cross-tabulation by gender and age group.

Experienced age-based discrimination within 24 months		Yes (%)	No (%)
Gender	Men (n=498)	6.2	93.8
	Women (n=204)	11.3	88.7
Age group	20-34 years (n=193)	9.8	90.2
	35-49 years (n=265)	3.4	96.6
	50-70 years (n=250)	10.8	89.2
TOTAL	(n=708)	7.8	92.2

Further cross-tabulation that simultaneously considered gender and age group (Table 3) revealed that women in all age groups reported experiencing discrimination more often than men. However, the number of respondents per gender*age group (for women) was fairly small (n=64-73), and these results can only be considered suggestive.

*Table 3. Experienced age-based discrimination = yes, cross-tabulation by gender*age group.*

Experienced age-based discrimination within 24 months = YES	Age group		
Gender	20-34 years	35-49 years	50-70 years
Men (%)	7.2	2.6	9.2
Men (n)	*9*	*5*	*17*
Women (%)	13.4	5.5	15.6
Women (n)	*9*	*4*	*10*

In the open comments, respondents in the youngest age group (20-34 years), both men and women, reported experiencing devaluing attitudes due to their age. For example: "*I have heard that I probably don't know what is required due to my age/experience*" (Man), "*An older male employee was joking to my face about 25-year-old employees how blue-eyed and ignorant they are about the business world, knowing well that I was myself a 25-year-old young woman*" (Woman). One person (a woman) describes how she was dismissed as the youngest in the team while another (a man) was given false promises about a permanent position and consequently left the organization.

Respondents in the oldest age group (50-70 years) gave several examples of the negative stereotypes and experiences they had encountered, interpreting these to be due to their age. These pertained both to men and women. For example: "'*An old dog cannot learn new tricks', always when some new issue or method is being talked about*" (Man), "*In recruitment interviews younger interviewers disregard me because I am more competent than them*" (Man), "*I was dismissed in the change negotiations as the only one from a 20-person team*" (Woman).

Only women respondents in the youngest and oldest age groups referred to intersections of age and gender. For example: "*A young woman -> does not know anything about managing people. This view is based solely on age and gender (other background info not available). Several cases continuously*" (Woman, 20-34 years), "*50+ women are stuck in their ways and cannot adjust of develop anything new*" (Woman, 50-70 years), "*A woman 55+ is no longer useful. Work is taken away, nothing to motivate*" (Woman, 50-70 years).

The rather general formulation of the exemplary comments above suggests that the perception of discrimination oftentimes stems from remarks wherein certain assumptions are made of an individual based on their age rather than remarks commenting on a specific deficiency of a person (such as lack of experience) that the person then interprets to result from their age. Naturally the latter type of comment can also be perceived as age discrimination, but not all the experiences of discrimination can be explained by misinterpretation, and many of them are rooted in unconscious bias and unfounded assumptions.

Then, we turned our attention to the statements describing the equity climate of the work community. Reliability analysis confirmed that the six statements had a good level of internal consistency (Cronbach's alpha = 0.781). Factor analysis (PCA) further revealed that they were only one component, with KMO measure of meritorious level (0.805) and statistically significant Bartlett's test of sphericity ($p < .001$). Henceforth, we named this construct Equity climate=EQC. We calculated a summated variable for EQC with values ranging from 0 to 30 (omitting 'cannot say' responses). We then categorized EQC into three groups: weak (0-12), moderate (13-23), and good (24-30).

Based on the results presented earlier, we focused next on differences in EQC by gender, age group, and experienced discrimination. The results depicted in Table 4 show that categorized EQC was at moderate level for approximately half of the respondents in all groups, but there were stark differences in percentage shares for 'poor' and 'good' EQC.

Table 4. Equity climate (categorized) in the work community: cross-tabulation by gender, age group and experienced discrimination (=ExpDisc).

Equity climate (sum, categorized)		Poor (%)	Moderate (%)	Good (%)
Gender	Men (n=498)	22.1	51.4	26.5
	Women (n=204)	29.1	54.4	16.2
Age group	20-34 years (n=193)	29.0	53.4	17.6
	35-49 years (n=265)	21.5	54.7	23.8
	50-70 years (n=250)	23.6	49.2	27.2
ExpDisc	Yes (n=55)	40.0	47.3	12.7
	No (n=653)	23.0	52.8	24.2
TOTAL	(n=708)	24.2	52.3	23.5

The results revealed that compared to men, women less often rated their workplace equity climate as good, and more often as poor. The differences were statistically highly significant ($\chi^2(2) = 10.03$, $p < .007$). Results by age group showed that EQC was less often good and more often poor among the youngest group, but the differences were not statistically significant ($\chi^2(4) = 7.79$, $p < .099$). Furthermore, the results differed remarkably based on experienced discrimination: categorized EQC for respondents who had experienced age-based discrimination was poor almost twice as often (40.0 %) than for those who had not

(23.0%), while EQC was good for only 12.7% as compared to 24.2%, respectively. These differences were statistically significant ($\chi^2(2) = 9.22$, $p < .01$).

Finally, to further analyze how gender, age group and experienced age-based discrimination impact EQC, we conducted a three-way ANOVA. We found that there was no statistically significant three-way interaction between gender, age group and experienced discrimination, $F(2, 690) = 89.98$, p = .138. Nonetheless, there was a statistically significant gender*age group interaction, $F(2, 60) = 4.38$, $p = .013$.

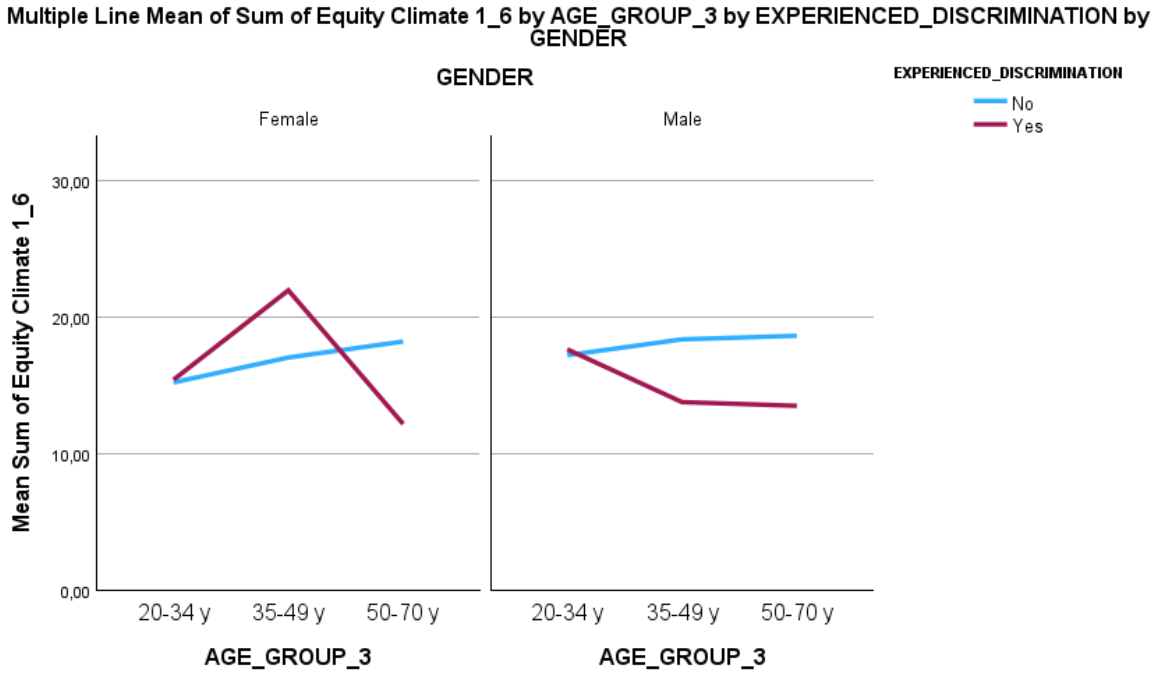

Figure 1. Gender differences in Equity Climate (sum) by age group and experienced discrimination.

As Fig1 illustrates, experienced age-based discrimination did not have much impact on the summated EQC for both men and women in the youngest age group, but the means for women were lower than for men. On the other hand, experienced discrimination clearly decreased EQC for men in older age groups. Surprisingly, the result for women was mixed: summated EQC was higher for women who had experienced discrimination in age group 35-49 years but then dropped clearly for women in age group 50-70 years. Nonetheless, we suspect that the very small number of respondents (n=4) in the group (women*35-49y*ExpDisc) at least partly explains the discrepancy.

Discussion

Our finding that women with MSc degrees in engineering/technology perceive experiencing age-based discrimination at work more often than men aligns with prior studies [e.g., [11], [13], [15-16], [31]) and our expectations. The percentage share of women reporting experiences of age-based discrimination is nearly double compared to men, and these gender differences hold for all three age groups. Nevertheless, we were somewhat surprised to find that reported age-based discrimination was nearly as common towards younger (less than 35 years) as towards older (50 years or more) professionals, both men and women, since previous studies have not provided such comparisons. Therefore, our study extends the literature on discrimination in engineering/technology by illustrating how age intersects with gender, and that (majority) men can also experience discrimination. Moreover, our study contributes to the literature on ageism and age-based discrimination by confirming that it occurs also against younger employees, as some studies have indicated [28], [30]. Similar findings have been reported for engineering in Canada [16]. Further studies could explore to what extent these findings apply to other countries.

This study explores the usage of a new construct, Equity Climate (EQC), based on six statements. Drawing on prior studies of masculine culture(s) in engineering/technology workplaces [1–2], [4–8], [13–16], we were not surprised to find that compared to men, women less often rated EQC as good and more often as poor. On the other hand, since the linkages between discrimination and equity climate have not hitherto been studied (to our knowledge), we could not hypothesize on their direction or magnitude. Yet, the finding that EQC differs remarkably based on experienced discrimination was not particularly surprising but rather confirmed our speculations.

The findings indicate that since men less often encounter discrimination than women, and consider the equity climate good, they are probably less willing to engage in improvements. As Galos and Coppock [3] point out, pro–status quo forces tend to dominate in workplaces. Those who A. have not personally experienced discrimination and B. are more likely to be in positions of power, i.e. majority men, tend to be more satisfied with the status quo (e.g., [32]). On the other hand, experienced discrimination seems to impact men's views of equity climate more than women's. Although Bairoh and Putila [31] did not study EQC, their findings suggest that men who had experienced (gender-based) discrimination were rather pessimistic about equity in their work communities. Analyzing such results further could

yield interesting insights on how to improve both gender and age equality in engineering/technology workplaces, both in Finland and elsewhere.

Certain previous studies conducted in Finland illustrate that diversity, equity and inclusion (DEI) initiatives introduced in engineering/technology workplaces may encounter backlash ([31], [33]). Targets aiming at increasing the number or percentage share of women have been criticized for discriminating against men [31] while executives in technology companies worry about violating the principles of meritocracy ([33]; see also [15]). These concerns may arise not only due to beliefs about women being less (technologically) competent than men (e.g., [34]), but also due to the surprisingly widespread belief that gender equality has already been 'achieved' in Finland (e.g., [35]) and consequently in Finnish (technology) workplaces [33].

Age discrimination, like other forms of discrimination, negatively influences the well-being of workers of all ages and backgrounds [22], [36]. On the other hand, an inclusive intergenerational workplace climate not only helps buffer against ageism but also enhances job satisfaction and retention of all employees [36]. Therefore, it is vital that ageism and age discrimination are included in the DEI programs in organizations. Since age discrimination impacts men as well as women, perhaps addressing ageism would not ignite such backlash in engineering/technology workplaces as some other equality initiatives have done.

Limitations

The study relies on the respondents' perception of experienced discrimination and inappropriate treatment and their interpretation that it was due to their age, and it is not possible to verify by any objective method whether this discrimination occurred.

Prior studies conducted in the United States and Canada have demonstrated that ethnicity or 'race' may significantly impact experiences of discrimination and sense of belonging. This is likely to apply also to Finland, particularly since 'non-white' persons encounter racism in Finland more often than in many other European countries [37]. It would also be important to study the intersections of age with sexual orientation and/or belonging to a gender minority, since previous studies illustrate that belonging to a gender minority significantly hampers the belonging of engineering students [38] and LGBTQ+ engineering students experience significantly more discrimination and harassment than majority students [39]. Nonetheless,

the data used in this study, unfortunately, did not lend itself to such analysis. Although belonging to various minorities was inquired, only 3-15 persons in the sample belonged to each minority category (other than linguistic minority) and thus the data was insufficient in this regard.

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