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Gender inequality in adult education: a comparative study of four adult learning systems

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ABSTRACT

This study explores gender-related inequality in participation in Adult Education and Training (AET) in four countries with vastly different adult learning systems and support measures for women's AET. Our examination of the data from an original international survey conducted in 2022 has found that the participation of men and women clearly differs among types of AET. Despite the frequently reported equal gender participation rates, the presented findings show that men participate more in job-related and employer-sponsored non-formal education (NFE), while women manage to develop more general skills in non-job-related and non-employer-sponsored NFE. Furthermore, our findings reveal that the primary reasons for participation in NFE are remarkably similar between men and women and, therefore, cannot be used as a source of explanation for different participation patterns. In addition, the extent of gender inequality in job-related and employer-sponsored NFE across countries exhibits minimal variation. All this implies that countries with vastly different adult learning systems currently display a degree of similarity in gender inequality regarding NFE, which could be determined more by characteristics of the labor market than the welfare regime.

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Introduction

European societies are currently navigating significant societal challenges. Firstly, an ageing population is straining pension and healthcare systems, while simultaneously fuelling demand for increased labour and continuous skill updating (European Commission 2019). Secondly, the shift towards a digital and green economy is creating a need for adult upskilling and reskilling (European Commission 2016; European Council 2019). In response, post-compulsory adult education and training (AET) has emerged as a dual solution, addressing these challenges while also serving as a proactive strategy (European Commission 2020; Holford et al. 2022). Consequently, AET has become a cornerstone of social investment strategies in Europe (European Parliament 2017), with the aims of managing the consequences of an ageing population (Hemerijck 2018; Hemerijck and Ronchi 2022) and facilitating a shift towards knowledge-based economies (Hall 2018, 2022).

Nevertheless, AET participation in Europe remains below the EU benchmarks, with targets missed twice between 2000 and 2020 (Holford 2023; Holford and Milana 2023). Moreover, the engagement of adults in AET among different sociodemographic groups is uneven, resulting in unequal participation in organised learning and its benefits (Boeren 2016, 2023; Boyadjieva and Ilieva-Trichkova 2017).

In addressing the issue at hand, the position of women stands out distinctly. The involvement of women in AET entails not merely an increase in their representation in the workforce, but also a leap in their social mobility and an enhancement in the quality of their employment roles and life chances (Boeren 2016; Estevez-Abe 2005; Stoilova et al. 2023; Vaculíková et al. 2021). Conversely, inequality in

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AET can lead to social exclusion, limiting the chances of women for personal development, community participation, and civic engagement (OECD 2017). In response, UNESCO (2020) recognizes securing equal involvement of women in education and training as a fundamental goal in its development strategy.

Following this trajectory, this article *explores timely evidence regarding the state of gender inequality in participation in AET in four European countries*, each representing different models of gendered AET provision and support: Sweden (Nordic, social democratic regime), Germany (continental, Christian democratic regime), the United Kingdom (liberal regime), and the Czech Republic (post-socialist regime). Due to their high institutional diversity, these countries provide an optimal case for purposeful empirical comparison.

To investigate gender-related inequality in AET, we analyse data from a dedicated survey on AET conducted in four mentioned countries in 2022. The paper focuses on three interconnected research aims to understand the differences between men and women in their participation in organised adult education:

1. **RA1:** To assess and compare the participation rates of men and women in various types of AET across the four countries. Specifically, in (a) Formal Adult Education (FAE), (b) Non-Formal Education (NFE), (c) job-related and non-job-related NFE and (d) employer-sponsored and non-employer-sponsored NFE.
2. **RA2:** To investigate whether the main purpose of participation in NFE differs by gender.
3. **RA3:** To investigate how various explanatory factors, such as age, the highest level of attained education, labour status, and socioeconomic status, influence the likelihood of men and women participating in job-related NFE and employer-sponsored NFE.

The article is structured as follows. The forthcoming section reviews current findings on inequality in AET participation and explains how our research builds on this existing body of work. Subsequently, we detail the survey methodology. The next section presents the main findings, organized around the three primary research aims. Finally, we discuss our results, including their implications and limitations. These results contribute to understanding the labor market positions and trajectories of women in different country contexts.

State of the art

Despite existing research efforts, the issue of gender-based inequality in AET participation remains unresolved, with studies yielding varied and often contradictory results. Previous research, which utilises data mainly from international comparative surveys from the mid-2000s and early 2010s such as the Adult Education Survey (AES) and the Programme for the International Assessment of Adult Competencies (PIAAC), has produced contradictory evidence which cannot be generalised into the simple conclusion that women participate in AET less than men, and that women face systemic exclusion from AET. Instead, gender inequality in AET has been shown to be a more complex phenomenon (Stoilova et al. 2023).

Although initial observations suggest that men and women participate in AET at similar rates (Albert et al. 2010; Arulampalam et al. 2004; Boeren 2011; Dieckhoff et al., 2007), a closer examination reveals significant disparities on three levels.

Inequality between various types of AET and reasons for participation

At the first level, disparities become evident in comparisons of *different types of AET*, such as FAE versus NFE, job-related versus non-job-related NFE, and NFE financially supported by employers versus those that are not. In each of these categories, the participation of men and women varies considerably. One conclusion from previous studies (Dämmrich et al. 2015; Desjardins et al. 2006; Dieckhoff and Steiber 2011; Evertsson 2004; Vaculíková et al. 2021; Wozny and Schneider 2014; Zoch, 2023) suggests that gender-related inequality in AET is less visible, and it is connected with engagement in types of AET that focus more on the direct acquisition of job-related skills and are financed by employers. In other words, those that are directly related to labor market inequalities. In this regard, women are less financially

supported by employers and are less involved in job-related NFE, while they are engaging more in non-job-related NFE and publicly supported AET.

According to both human capital theories (Becker 1975, 1985) and theories of labor market segregation (Polachek 1981), several mutually reinforcing mechanisms contribute to this phenomenon. Firstly, women tend to invest less in workplace training due to lower anticipated returns on such investments. They often expect career interruptions due to motherhood and parenthood more than men. Secondly, employers recognize this potential for career interruption and, thus, lower returns on their own investment, making them less inclined to support and sponsor training for female employees (Becker 1975, 1985). Additionally, the unequal division of labor at home results in women having more unpaid work obligations outside their jobs (Schober and Zoch 2019), which poses a significant barrier to their participation (Massing and Gauly, 2017; Vaculíková et al. 2021). In contrast, men tend to invest more in their training when they expect to become or become fathers (Dieckhoff and Steiber 2011), as they often assume the role of primary breadwinner (Schober and Zoch 2019). However, Zoch (2023) found that parenthood represents a training penalty for both sexes, though it is much higher for women. Finally, women are often employed in labor market segments that offer fewer training opportunities (Dieckhoff and Steiber 2011; Wotschack 2019) and less pressure on continuous skill enhancement. According to Polachek (1981), this is, at least partially, due to the first described mechanism: women's anticipation of career interruptions, which leads them to choose job tracks that allow them to balance work and family care.

However, it remains unclear if the disparities in participation rates identified at the beginning of the 2010s persist, particularly in how men and women engage in various types of AET (FAE/NFE, job-related NFE and employers-supported NFE) in the post-COVID-19 world. Specifically, it is uncertain whether there is a trend toward equal participation between genders, or if gender inequalities persist. Moreover, our understanding of the motivations of women to participate in AET, a crucial aspect that distinguishes it from men's involvement, is limited (Boeren et al. 2012). Understanding the 'why' behind women's participation is vital for effectively tailoring organized learning opportunities to meet their specific needs and coping with the inequality that has been identified.

Inequality between various adult learning systems

At another level, the degree of inequality in AET participation among women *varies across countries* and is influenced by each *nation's institutional framework*. These frameworks incorporate support for women in organized learning, the inclusion of women in the labor market, family and caregiving, as well as societal norms regarding women's roles (Bambra 2004, 2007; Dämmrich et al. 2015; Dieckhoff and Steiber, 2011; Esping-Andersen 2006; Estevez-Abe 2005). Countries with well-developed welfare systems, progressive family policies and a high level of defamilisation, ie the extent to which the welfare state undermines women's dependency on the family and facilitates women's economic independence, as well as a modern perspective on women's societal roles, all tend to exhibit lower levels of AET inequality (Dämmrich et al. 2015; Desjardins 2017; Dieckhoff and Steiber, 2011). These nations often encourage women's participation in both FAE and job-related NFE. Thus, they display lower levels of inequality in the types of AET stated above. Building upon Esping-Andersen's (1990, 2006) original typology and its gendered adaptations (Bambra 2004, 2007), as well as the variety of capitalism approach (Estevez-Abe 2005) that conceptualize different strategies for women's skill training in the labor market, we can theoretically identify four distinct adult learning systems. Each is characterized by varying degrees of gender inequality in AET participation and the structure of support institutions.

Firstly, the Nordic adult learning system (eg Sweden, Norway, Finland, and Denmark) is noted for its high level of defamilisation of care (Bambra 2004; Dieckhoff and Steiber 2011) and robust support systems for women in both FAE and NFE, including job-related NFE (Green 2021; Rubenson 2006). Strong job protection for women (Estevez-Abe 2005) combined with these factors should reduce the disadvantages women face regarding parenthood and make it advantageous for both women and employers to invest in their training.

Secondly, the liberal adult learning systems common in Anglophone countries (eg the United Kingdom, the United States, and Ireland) offer limited support for women in AET, especially from

employers. However, they maintain gender neutrality in job-oriented NFE for skilled individuals of both genders due to the orientation toward general skills within the initial education system. As a result, men and women have more equal access to job-related NFE, as both require more company- or profession-specific training later in their careers (Estevez-Abe 2005). However, a low level of defamilisation (Bambra 2004, 2007), limited social benefits, and the minimal role of the state are typical, which could increase the training gap for women due to family obligations and make employers reluctant to invest in their skills.

Thirdly, the continental adult learning systems (eg Germany, Belgium, France, Netherlands), rooted in a tradition of Christian-democratic welfare regimes, are characterized by enhanced job protection (Dämmrich et al. 2015). Career interruptions, particularly for women, are a significant concern given the high importance placed on specialized skills (Estevez-Abe 2005). This combination of factors could positively influence employers' willingness to invest in women's job-related NFE. However, job-specific skills are often delivered through specialized vocational education tracks, leading to early labour market segregation. This can place more women in jobs with fewer opportunities for training and lower expectations to invest in job-related training throughout their careers due to their chosen professional paths. Given that medium levels of defamilisation are typical (Bambra 2004, 2007), we could expect low participation in job-related training for women.

Finally, the post-socialist adult learning systems (eg the Czech Republic, Slovakia, Poland, Estonia, and Russia) exhibit less developed support systems for AET (Saar et al. 2023) and present a mix of contrasting factors. High labor market participation by women might suggest reduced inequality in job-related NFE (Večerník 2022). However, a traditional gender culture emphasizing caregiving and familial roles for women may reduce employer willingness to support women's further education (Szelewa and Polakowski 2020). Thus, a high level of gender inequality in this regime should be expected (Dämmrich et al. 2015; Vaculíková et al. 2021).

In relation to our empirical research, following the findings of Dieckhoff and Steiber (2011) and Dämmrich et al. (2015), we anticipate the smallest AET gap for women in Sweden, a representative of the Nordic adult learning system. This is followed by the UK (Liberal) and Germany (Continental) with the highest level of inequality expected in the Czech Republic (post-socialist adult learning system). However, recent liberalization trends across welfare regimes (Hemerijck and Ronchi 2022; Thelen 2014) may have adversely affected capacity of adult learning systems to support women's engagement in AET. Consequently, it is necessary to examine whether the distinctions among these different systems remain valid.

Intersectionality

A third form of gender-related inequality in AET is intricately *linked to intersectionality*, an examination of which reveals that women's opportunities in AET vary significantly based on factors like age, economic activity, highest attained education and occupation (Stoilova et al. 2023). Despite the importance of intersectionality, only a limited number of studies (Stoilova et al. 2023) have specifically examined whether women from diverse backgrounds participate more or less in organised learning programs compared to their male counterparts with similar educational or socioeconomic backgrounds.

To fully grasp the complexities of gender-related inequality in AET, a concentrated analysis of three key factors (age, highest attained education and occupation status) is important. By delving into these areas, we can move past the apparent similarities in AET participation between men and women to identify the pivotal junctures at which gender equality can be effectively addressed.

Method

Data

The analyses presented here are based on data from an original international survey conducted in 2022 by a specialized agency using the Computer-Assisted Web Interview (CAWI) method. The research sample comprised 4000 adults, structured as a stratified quota sample of individuals aged 25–64, with

1000 respondents from each participating country – each representing markedly different adult learning regimes, labor markets and support measures for women. The sample size was uniformly set at 1000 respondents per country, in line with the planned analytical procedures and recommended sample size (Bujang et al. 2018).

This sampling strategy was designed to ensure the representativeness of the adult population across key demographic characteristics such as age (across cohorts from 25 to 64 years), gender, region (NUTS 01), participation in the labor market, and size of residence. However, it was not possible to achieve a representative distribution of educational attainment in the United Kingdom and Germany, where our samples exhibited a disproportionately higher number of adults with tertiary education (see discussion section below). Throughout all phases of the survey process, emphasis was placed on ethical research principles, particularly anonymity and adherence to the ICC/ESOMAR International Code (International Chamber of Commerce/ESOMAR, 2016). Informed consent was obtained from all participants, ensuring that ethical implications were respected and the safety and rights of all respondents were protected.

Variables

In this paper, we differentiate participation in two principal types of AET: FAE and NFE. FAE encompasses institutionalised learning activities that form part of structured hierarchical programmes, characterised by a chronological succession of educational levels and grades, specific admission requirements, formal registration, and recognition by relevant national education authorities or their equivalents. Completion of these programmes is acknowledged through the attainment of qualifications at the ISCED level. Conversely, NFE includes institutionalised learning activities that also consist of structured hierarchical programmes but are not recognised by the relevant national education or equivalent authorities. This category encompasses a range of educational practices, including various courses such as seminars/workshops, private tuition, private lessons, and guided on-the-job training. NFE can have both job-related and non-job-related learning goals (CLA 2016). Participation in these learning activities is measured over a 12-month reference period prior to the survey, similar to the methodology used in the biggest comparative surveys like the AES or the PIAAC. Given that gender inequality in participation appears as a crucial phenomenon in the context of NFE, in relation to our first research aim (RA1), we also focus on items measuring participation in two subtypes of NFE: (1) according to job orientation (job-related NFE vs. non-job-related NFE), and (2) according to employer support (employer-sponsored vs. non-employer-sponsored NFE).

Regarding the second research aim (RA2), the study measured the reasons for participation in NFE by evaluating responses to a series of items indicating job and non-job-related reasons. Job-related reasons encompass objectives such as acquiring a certificate, gaining monetary/non-monetary rewards, or improving career prospects. In contrast, non-job-related reasons for participation in NFE were assessed through the items focusing on the personal satisfaction derived from participation or the fulfilment of social needs, such as meeting new friends (Boeren et al. 2012; Boeren 2016).

For the third research aim (RA3), we used items measuring NFE job orientation and employers' support of NFE as dependent variables in logistic regression analysis (see [Supplementary Table 3](#)). As independent variables expected to influence participation rates in AET, with a particular focus on variations by gender and socio-demographic group, we selected three sets of variables. At the micro-level (Level 1), we included key socio-demographic characteristics widely acknowledged as strong predictors of participation in NFE. These include age, education level, employment status, type of employment contract, and occupational status, as indicated by previous studies (Dämmrich et al., 2014, 2015; Jenkins, 2021; Kalenda et al. 2020; Kilpi-Jakonen et al., 2012). At the meso-level (Level 2), we added employer characteristics and place of residence as additional factors that may influence AET participation, following the findings of Dieckhoff and Steiber (2011). At the macro-level (Level 3), we examined gender disparities in training participation across four distinct welfare regimes, represented by four purposely selected countries, each with different approaches to gender inequality in AET (Dämmrich et al., 2015; Estevez-Abe, 2005). A detailed presentation of these variables and their nominal categories is available in [Supplementary Table 1](#).

Data analysis

Regarding a potential gender gap in education and training participation among countries in FAE, NFE and NFE related to job orientation and employer support (RA1), and to compare the purpose of men and women regarding participation in NFE (RA2), descriptive statistics were applied along with the non-parametric Mann-Whitney U test and Chi-square tests for goodness of fit. To analyse the impact of micro- (Level 1), meso- (Level 2), and macro-level (Level 3) variables on participation in two main subtypes of NFE according to job orientation and employer support, binary logistic regression models were calculated using the Enter method. Hierarchical logistic regression was applied (RA3) to reflect the three levels of explanatory variables.

In the context of our analysis, the designation 'hierarchical' is understood as the gradual enrichment of models with three levels of independent variables. We present values for individual models in order to compare the changes after adding each level (see [Supplementary Table 3](#)). Variables were entered in steps (or blocks) in a predominant order, and in doing so, we were able to see if the following block of variables enriches predicting the dependent variable. In the first block, we entered micro-level variables into the analysis. This had the effect of statistical control for these variables. In the second step, selected meso-level variables were added to the model as a block. The difference this time is that the possible effect of micro-level variables had been removed, and therefore, we could then see whether our block of independent variables was still able to explain some of the remaining variance in the dependent variable.

More specifically, *Level 1* of each model (M1 and M3 for women, and M2 and M4 for men) was restricted to micro-level variables (socio-demographic and labour market-related characteristics of individuals), while *Level 2* included both micro and meso-level independent variables (residential location and company size). Finally, *Level 3* represented the last model that included all tested variables, ie micro-, meso-, and macro-level (country) variables. Moreover, we decided to distinguish among job-orientation of NFE to identify explanatory patterns within job-related and non-job-related learning activities, as well as within employer-sponsored and non-employer-sponsored adult learning distinguished by employer support. On this basis, we were able to evaluate participation as a complex structure with multiple layers (Boeren 2016, 2023) as well as to determine whether the effect of predictor variables remained valid in a 3-level multivariate analysis or whether they persisted under the interactions with other predictors. Lastly, assumptions in the form of low inter-correlations among predictor variables were checked.

Results

Participation rates

An overview of the primary descriptive participation rates in adult learning divided by gender and country is provided in [Table 1](#). In total, higher participation rates during the last 12 months can be found in NFE (49%) compared to FAE (18%) in all countries, with NFE becoming increasingly job-oriented (37%) and employer-sponsored (35%). Overall, participation rates appear to be the highest in the Nordic country represented by Sweden.

The highest gendered differences in participation rates occur in NFE: being a women is associated with fewer NFE activities that are job-related and employer-sponsored. On the other hand, non-job-related and non-employer-sponsored NFE is a domain of women. Nevertheless, the results do not show a consistent disadvantage regarding women's participation in organised adult learning. While women participate less than men in job-related and employer-sponsored training in most countries, they participate in non-employer financed training more for personal reasons. This connection is further accentuated in the multivariate frequency distribution displayed in the cross-tabulation analysis (see [Supplementary Table 2](#)).

Across selected countries and contrary to our theoretical assumption, women's disadvantage in participation in AET is the lowest in the United Kingdom (in which women are in fact advantaged in all types of participation), followed by Sweden, while the highest differences can be found in the Czech Republic, followed by Germany. Taken together, the overall results (see the last column of [Table 1](#)) imply

Table 1. Participation rates in various forms of adult learning by gender and country.

	Sweden (n = 1000)	Germany (n = 1000)	United Kingdom (n = 1000)	Czech Republic (n = 1000)	Total (n = 4000)
	Chance in p.p	Chance in p.p	Chance in p.p	Chance in p.p	Chance in p.p
	n (%)				
Participation in adult learning					
<i>Participation by organization</i>					
Participation in FAE	307 (42)	152 (21)	160 (22)	113 (15)	732 (18)
Women	166 (54)	60 (40)	99 (62)	55 (49)	380 (52)
Men	141 (46)	92 (60)	61 (38)	58 (51)	352 (48)
Participation in NFE	546 (28)	458 (24)	467 (24)	475 (24)	1,946 (49)
Women	280 (51)	217 (47)	257 (55)	219 (46)	973 (50)
Men	266 (49)	241 (53)	210 (45)	256 (54)	973 (50)
<i>Participation by purpose</i>					
Participation in job-related FAE	241 (43)	121 (22)	117 (21)	77 (14)	556 (14)
Women	126 (52)	45 (37)	77 (66)	38 (49)	286 (51)
Men	115 (48)	76 (63)	40 (34)	39 (51)	270 (49)
Participation in non-job-related FAE	66 (38)	31 (18)	43 (24)	36 (21)	176 (4)
Women	40 (61)	15 (48)	22 (51)	17 (47)	94 (53)
Men	26 (39)	16 (52)	21 (49)	19 (53)	82 (47)
Participation in job-related NFE	401 (27)	346 (24)	356 (24)	360 (25)	1,463 (37)
Women	197 (49)	151 (44)	201 (56)	143 (40)	692 (47)
Men	204 (51)	195 (56)	155 (44)	217 (60)	771 (53)
Participation in non-job-related NFE	145 (30)	112 (23)	111 (23)	115 (24)	483 (12)
Women	83 (57)	66 (59)	56 (51)	76 (66)	281 (58)
Men	62 (43)	46 (41)	55 (49)	39 (34)	202 (42)
<i>Participation by cost</i>					
Participation in employer-sponsored NFE	419 (30)	311 (23)	309 (22)	341 (25)	1,380 (35)
Women	207 (49)	133 (43)	172 (56)	134 (39)	646 (47)
Men	212 (51)	178 (57)	137 (44)	207 (61)	734 (53)
Participation in non-employer-sponsored NFE	127 (22)	147 (26)	158 (28)	134 (24)	566 (14)
Women	73 (58)	84 (57)	85 (54)	85 (63)	327 (58)
Men	54 (42)	63 (43)	73 (46)	49 (37)	239 (42)

gender inequality participation in NFE, while participation in FAE is more gender-neutral and therefore, not included in the analysis which follows.

Reasons of participation in NFE

Figure 1 presents a detailed analysis of gender-specific reasons for participation in NFE. Broadly speaking, no significant gender differences are shown related to job-related or employer-sponsored learning. A notable variation does emerge, however, in the reasoning rooted in the ‘fear of losing a job.’ Here, women show marginally higher rates, driven by a perceived higher risk of job loss compared to men. Still, this difference is not statistically significant, although the data indicates that within the realm of personal-related reasons for engaging in NFE, women are less likely than men to declare ‘taking a break from the routine at home and work’ as a reason of participation. This trend holds true across both non-job-related and non-employer-sponsored training contexts.

Gender gaps related to participation in NFE

The research aim underlying the following multivariate analyses is to investigate how micro-, meso-, and macro-level variables predict the likelihood of men and women participating in NFE related to job-related and employer-sponsored training (see Table 2). All models demonstrated statistical significance ($p < .0005$) and accurately classified between 73.1% and 81.3% of cases, with the most significant improvement of 6.8% points, a result which is explained between 16% (Cox and Snell R^2) and 22% (Nagelkerke R^2) of the variability in participation. For a detailed summary of the quality parameters of these models, see Supplementary Table 3.

Gender inequality participation in job-related NFE

The likelihood of participation in job-related NFE is significantly influenced by active engagement in the labour market. Nevertheless, this positive correlation is notably weaker for economically active women than for men, being only half as strong. When meso- (level 2) and macro- (level 3) variables are introduced into the women’s model (M1), this effect shows a slight decline, whereas it remains relatively

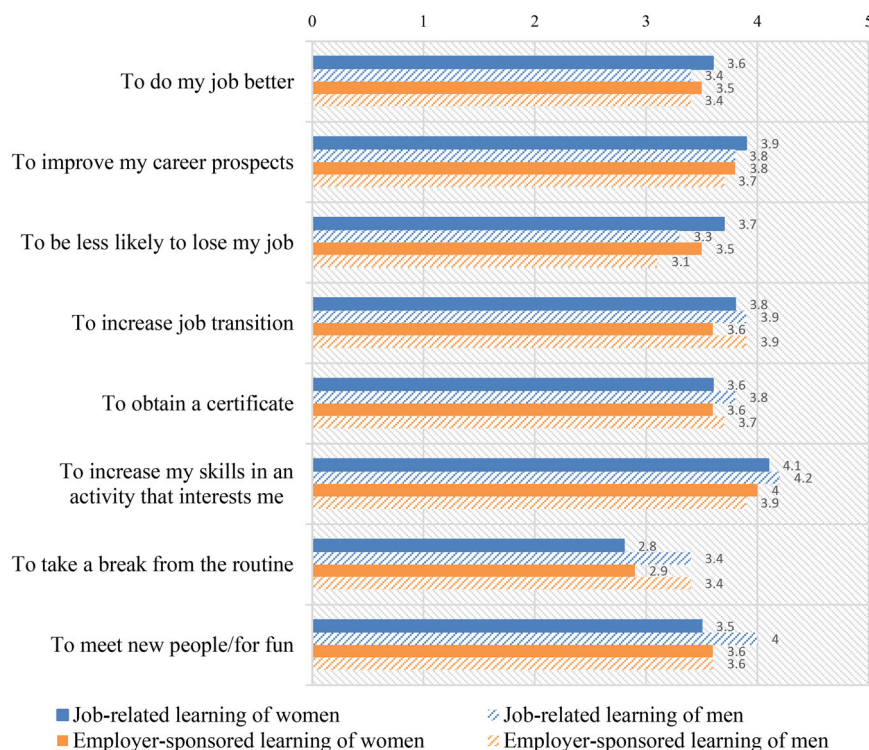


Figure 1. Reasons for participation in NFE, by gender ($n = 4000$).

Table 2. Results of logistic regression models for participation in NFE, by purpose and cost.

	Job-related NFE (by purpose)						Employer-sponsored NFE (by cost)					
	women (M1)			men (M2)			women (M3)			men (M4)		
	level 1	level 2	level 3	level 1	level 2	level 3	level 1	level 2	level 3	level 1	level 2	level 3
<i>Micro-level variables</i>	Exp(B)											
Age (ref. 25–44 years)	0.809	0.835	0.851	0.989	1.003	1.076	1.037	1.113	1.109	1.112	1.128	1.206
Education (ref. ISCED 3c or lower)	0.910	0.908	0.899	0.762	0.790	0.869	1.003	0.981	0.888	1.053	1.033	1.006
ISCED 3ab–4	1.172	1.187	1.092	0.896	0.915	1.065	0.881	0.826	0.804	0.843	0.850	0.946
ISCED 5–8	0.244**	0.275**	0.283**	0.127**	0.130**	0.130**	0.259**	0.323**	0.318**	0.144**	0.158**	0.153**
Economic status (ref. active)	0.608**	0.630*	0.618*	0.453**	0.488**	0.485**	0.567**	0.634**	0.660**	0.428**	0.493**	0.476**
Employment status (Ref. 1 FTE)	1.150	1.178	1.147	0.996	1.015	1.166	0.975	10.012	0.979	0.881	0.919	1.013
Employment contract (ref. Permanent)	0.570*	0.633*	0.625*	0.834	0.815	0.934	0.296**	0.331**	0.321**	0.365**	0.392**	0.455**
Temporary employment contract	0.929	0.914	0.871	1.145	1.137	1.208	0.987	0.973	0.891	1.087	1.107	1.118
No contract or work as subcontractors	0.878	0.845	0.826	0.741	0.755	0.753	0.805	0.762	0.769	0.703	0.709	0.708
Occupational status (ref. ISCO 1–2)	Exp(B)											
ISCO 3–7	1.562	1.524	1.524	0.547	0.547	0.558	1.371	1.371	1.355	1.355	0.973	1.008
ISCO 8–9	1.240	1.240	1.204	0.543	0.543	0.596	1.440	1.440	1.372	1.372	0.641	0.650
<i>Meso-level variables</i>	1.091	1.091	1.066	0.496	0.496	0.530	1.127	1.127	1.116	1.116	0.714	0.763
Size of res. location (ref. up to 999)	1.744**	1.744**	1.734**	0.953	0.953	0.944	2.109**	2.109**	2.072**	2.072**	1.482	1.451
1,000–19,999 inhabitants	1.442	1.442	1.424	1.346	1.346	1.432	2.029**	2.029**	1.997**	1.997**	1.614*	1.730*
20,000–99,999 inhabitants	1.214	1.214	1.214	0.816	0.816	0.816	1.017	1.017	1.017	1.017	0.760	0.760
100,000 or more inhabitants	1.118	1.118	1.118	0.623	0.623	0.623	1.720*	1.720*	1.720*	1.720*	1.150	1.150
Company size (ref. less than 50)	1.367	1.367	1.367	0.509*	0.509*	0.509*	1.010	1.010	1.010	1.010	0.538*	0.538*
50–250 employees	Exp(B)											
More than 250 employees	1.017	1.017	1.017	0.760	0.760	0.760	1.150	1.150	1.150	1.150	0.760	0.760
<i>Macro-level variables</i>	1.720*	1.720*	1.720*	1.720*	1.720*	1.720*	1.720*	1.720*	1.720*	1.720*	1.720*	1.720*
Country (ref. Czech Republic)	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118
United Kingdom	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118
Germany	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118
Sweden	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118	1.118

** $p < .01$.* $p < .05$.

stable in the men's model (M2). Consequently, being out of the labour market has a more detrimental impact on women's ability to update skills and reskill compared to men.

In terms of employment status, part-time workers are less likely to participate in NFE than full-time employees, with a likelihood 1.6 times lower for women and 2.1 times lower for men. For women, working without an employment contract is negatively associated with NFE participation, a trend not observed in men. Additionally, higher participation rates in large companies were partially verified for women only. Women in medium-sized companies (50-250 employees) are approximately 1.7 times more likely to engage in job-related NFE than those in small companies (less than 50 employees), a rate exceeding that of women in larger companies as well as that of men in general.

Furthermore, the remaining (macro-level) variables do not significantly affect job-related NFE participation, with the exception of the country of origin for men (M2). Specifically, Swedish men have about a two times lower chance of participating in job-related NFE compared to Czech men. It is noteworthy that identical patterns emerge in non-job-related NFE, as confirmed by linear regression (not presented here). The significance of influencing factors is inverted, however, with negative impacts becoming positive and vice versa.

Gender inequality participation in employer-sponsored NFE

A multivariate analysis of employer-sponsored NFE reveals consistent patterns across all levels of regression models, regardless of gender. Echoing the trends in job-related NFE, economic activity emerges as the most significant contributor to these models. Specifically, economically active women are 3.1–3.9 times more likely to participate in employer-sponsored NFE compared to their non-economically active counterparts (M3). However, this likelihood is still only about half that of economically active men, who show a 6.3–6.9 times greater probability of participation in employer-sponsored NFE once the other variables are controlled for (M4).

Full-time employment significantly boosts NFE participation for both men and women. Full-time workers are approximately 2.8 times more likely to engage in employer-sponsored NFE compared to part-time workers, with men showing a marginally higher probability. Employment status, specifically working without a contract or as a subcontractor, negatively impacts the likelihood of both genders to participate in employer-sponsored NFE compared to permanent employees.

Company size is also a significant predictor in both gender models. Employees in larger companies have a higher chance of participating in NFE. Women in medium (50-250 employees) and large companies (over 250 employees) are about twice as likely to participate in employer-sponsored NFE compared to those in small companies (less than 50). Surprisingly, this likelihood is much higher than in the case of men.

In this context, employment in medium to large companies significantly increases the likelihood of women receiving financial support from their employers for training and development.

At the macro (country) level, German women have approximately double the likelihood of participating in employer-financed NFE compared to Czech women, a trend not significant among men. Conversely, Swedish men show a significant country-of-origin effect on participation in employer-sponsored NFE which is not observed in women. Identical patterns, albeit with the opposite influences of significant factors (ie negative effects become positive and vice versa), are found in models for non-employer-sponsored NFE (not presented here).

Discussion

This paper has aimed to deepen the understanding of gender differences in participation in various types of AET across four distinct adult learning systems. Although equal gender participation rates in adult learning were frequently reported (Arulampalam et al., 2004; Boeren, 2011; Dieckhoff et al., 2007; OECD, 2021), our findings show that men participate more in job-related and employer-sponsored NFE, while women tend to develop more general skills in non-job-related and non-employer-sponsored NFE. These findings support earlier large-scale analyses of PIAAC data from a decade ago (Dämmrich et al., 2015) and more detailed analyses using German panel data (Zoch, 2023). They also align with general theories of gender inequality in AET (Becker, 1985; Polachek, 1981), which argue that interrupted and

segmented career paths negatively affect women's chances of participating in job-related and employer-sponsored training. Factors such as parenthood interruptions, higher degrees of part-time employment in small-sized companies, and less stable career paths influence not only women's current careers and employment but also their participation in AET, which, in turn, affects their future prospects.

However, this does not mean that women participate less overall. Instead, they focus more on non-job-related NFE and often sponsor their own AET more frequently than men. It seems that this strategy may represent an alternative approach to addressing disadvantages in the labor market, aiming to compensate for these inequalities.

In the multivariate analysis of job-related NFE and employer-sponsored NFE, economic status emerged as the strongest explanatory factor for participation in both job-related NFE (models M1–M2) and employer-sponsored NFE (models M3–M4). Notably, the positive effect of active labor market participation is only half as large for economically active women compared to men. Therefore, women's inclusion in the labour market is a crucial precondition for their training. Moreover, consistent with human capital theory (Becker, 1975, 1985), employees with long-term commitments to their employers are viewed as more stable, making investment in their training more secure and profitable for the company. Consequently, full-time workers with permanent positions are more likely to engage in NFE during their careers. However, the results indicate that even in this context, female employees are less likely to participate in NFE compared to their male counterparts, highlighting a significant gender gap.

Further findings reveal that gender-specific NFE participation varies across the remaining significant meso- and macro-level variables. Higher participation rates in large companies were partly confirmed in the case of women, as women working for medium-sized companies had a higher chance to participate in job-related NFE than women working for small-sized companies (Dieckhoff and Steiber 2011). This was not found, however, for women in large companies. This finding could be the result of the specific segmentation of the employment inclinations of women, as they work more frequently in medium-sized companies (Albert et al. 2010). In contrast, company size did not affect the participation of male employees. Nevertheless, this variable also had a stronger positive effect in the case of employer-sponsored NFE regardless of gender: working for medium to large companies was linked to a higher likelihood of participating in NFE compared to employees working in small companies with less than 50 employees. This is likely the result of the fact that medium-sized and large companies are big enough to organise and provide on-the-job training, and they have more resources to invest in their employees (Albert et al. 2010; Baiocco et al. 2020). Further, larger firms have often developed gender equality strategies, which is less often the case with small companies, who typically have a less developed human resources policy (Baiocco et al. 2020).

Similar to the previous findings of Dämmrich et al. (2015) and Stoilova et al. (2023) based on the data from the 2010s, our research indicates that women still face a dual disadvantage in job-related NFE. Firstly, a marked gender inequality was found regarding participation to more costly training programs, particularly those financed by employers. This inequality manifests in a more limited participation of women in both job-related NFE and employer-sponsored NFE. Such disparities are partly rooted in cultural perceptions of motherhood and gender roles, which may influence employer assessments of future productivity. Due to their predominant caregiving responsibilities, women continue to be viewed as less reliable investment targets for training, rendering such expenditures less justifiable in the eyes of many employers, especially in small-scale organizations.

Secondly, while women tend to invest more in their own training through non-job-related and non-employer-sponsored NFE compared to men, the focus on developing general skills, as opposed to company-specific ones, often increases the already precarious nature of the career paths of women. Despite this population's greater engagement in self-directed learning, women continue to face disadvantages in the labour market, a trend further compounded by the fact that women's participation in NFE is often more extrinsically motivated compared to their male counterparts, particularly in terms of concerns over job security.

The analysis of gendered participation in job-related NFE has not revealed significant differences between countries, except for men in Sweden, who have a lower chance for participation compared to those in the Czech Republic. This difference could be attributed to the generally higher participation in FAE and non-job-related NFE among men in Sweden (Eurostat, 2024), that substitute this type of AET.

Additionally, the high employment-driven participation of men in job-related NFE in the Czech Republic may also explain this difference (see [Table 1](#)). In this context, we point out the possible limits of our study caused by the applied analytical approach based on a merged model for all included states. The advantage of our approach is the possibility to evaluate the monitored parameters at once (and minimize the possible negative effects of multiple steps of analysis on the same data). However, Mark and Jenkins (2016) offer a critical reflection of this approach.

A similar pattern is evident in employer-sponsored NFE, where men in Sweden receive significantly less support compared to other countries. Conversely, women in Germany have the greatest advantage in employer-sponsored NFE compared to the other three countries. Contrary to expectations in the literature (Estevez-Abe 2005), employers in Germany sponsor women's training the most.

These findings challenge the notion of significant differences between these four adult learning systems based on the characteristics of their welfare regimes (Bambra 2004; Esping-Andersen 2006) and models of skill formation (Estevez-Abe 2005), at least within the tested multivariate models which included micro-, meso- and macro-level variables, all of which deserve further research. This is particularly evident in the waning superiority of the Nordic model of adult education (Rubenson 2006) in terms of gender equity (Dieckhoff and Steiber 2011), a perspective recently questioned by Green (2021).

The convergence of these four countries regarding the observed pattern of equality in women's participation could have several causes. First, all countries have a very high level of women's labor force utilization (World Bank, 2024). As identified, the inclusion of women in the labor market is a key precondition for participation, and countries with similar inclusion rates may have similar basic conditions for women's training. Second, since the 2000s, women have benefited more from higher education expansion, resulting in a higher number of female graduates (DiPrete and Buchmann 2013), who are more likely to participate in AET (Boeren, 2016, 2023). Third, the liberalization across welfare regimes (Thelen 2014) may have hindered the greatest advantage of women in Sweden.

The increasing centrality of the workplace as a place for adult lifelong education brings even more significance to the need for more equitable participation in organised learning opportunities for women. Achieving this goal would require enhanced employer engagement in the coordination of AET, particularly in terms of support (Desjardins, 2017). Support efforts are particularly crucial in smaller companies, which often face limitations regarding financial resources as well as the expertise necessary to effectively foster the training and development of women. Moreover, direct training support (eg training vouchers or leaves) and incentives for employers (eg obligatory training time within working hours) targeted women with time-restricted or duration-limited job contracts are highly needed across all four countries. These measures are crucial as women with these job characteristics have a low likelihood of participating in both job-related and employers sponsored NFE.

Furthermore, we advocate for additional comparative research utilising recent data from international surveys like PIAAC and AES. Such research could validate the findings of the present paper, particularly as to whether the Continental Christian democratic model as observed here in Germany is in fact advancing in reducing gender-related inequality in AET more effectively than other regimes. More studies should also bring insights regarding whether post-socialist states continue to lag in this regard, and, if so, why.

Disclosure statement

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

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